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P001

Long-Term Outcomes of Laparoscopic Inguinal Hernia Repair in Veterans: Single Center Study

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Objective: Earlier reports from the Veterans Affairs medical centers, showed worse outcomes following laparoscopic inguinal hernia repair, with higher recurrence (10.1%) and morbidity rates (24.6%) compared to open approach (4.9% and 19.4%, respectively). The aim of this study is to explore outcomes and long-term follow-up of laparoscopic inguinal hernia repair at the VA hospital based in Detroit, Michigan.
Methods: The John D Dingell VAMC surgical database was queried for all laparoscopic inguinal hernia repairs performed between 2013–2018 by a single surgeon using a standard method. Data collection included demographics, operative details, postoperative outcomes, and follow-up visits. Patient phone calls were completed to obtain patient reported data. A $p < 0.05$ was considered to be significant.
Results: A total of 424 patients were identified [99.8% male, mean age 62.9 years, 50.9% > 65 years, mean BMI 25.8, 23.1% obese, 62.2% had ASA class ≥ III, 19.6% had high Charlson Comorbidity Score (CCS) (> 4), and 75.1% current smokers]. 34.7% had imaging preoperatively, 7.7% of hernias were recurrent, 11.6% were bilateral and 39.5% had previous abdominal surgery. Mean operative time was 1.6 h, and 1.2% were converted to open. 19.6% were admitted postoperatively with mean length of stay 2.2 days, 3.8% required readmission, and 2.1% required reoperation. Complications occurred in 91 (21.5%) of patients, including hematoma (12.5%), seroma (5.5%), urinary retention (4.0%), and surgical site infection (1.4%). Increased morbidity was significantly correlated with high CCS ($p = 0.045$), old age ($p = 0.024$), and ASA class ≥ III ($p = 0.018$). Patients were followed up 0–85 months, with a mean of 30.4 months. Phone calls follow-up was performed for 46.2%, patients reported 2.8% recurrence, 21.7% chronic pain, and 11.1% feeling the mesh. Overall, there were 43 (10.2%) deaths during the study period with none related to procedural complications.
Conclusion: Long-term follow-up for veterans who underwent laparoscopic inguinal hernia repair showed low recurrence rate, and low major complications rate. We advocate to use laparoscopic approach as the standard of care for inguinal hernias repair.

P002

Ovarian indirect inguinal hernia: A case report

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A 40-year-old multiparous woman presented to a rural emergency department with acute on chronic right groin pain and an associated lump lateral to her pfannensteil incision. The pain had been intermittent for one year but had become constant a week prior to presentation. This was associated with nausea, poor urinary flow and constipation. She had a past history of three caesarian sections, hysterectomy and appendicectomy. There was no history of genital anomalies or infertility. She had presented three days prior with pain, in the absence of a lump. A pelvic ultrasound at that time revealed a mildly tender right inguinal hernia containing freely mobile multiloculated cystic structure. The differentials included ovarian inguinal hernia or round ligament cyst (Fig. 1). Doppler imaging was not performed at this time.

Her laboratory investigations were unremarkable. However, a repeat pelvic ultrasound demonstrated inflammation and oedema of the right ovary with mild venous flow and no arterial flow (Fig. 2). A computerised tomography (CT) scan of the pelvis revealed an enlarged right ovary, adjacent fat stranding and engorged ovarian vessels. No inguinal hernia was visualized (Fig. 3). The ovary was in the pelvis.

General surgery and gynaecology were referred for a presumed torted-detorted ovary secondary to incarceration within an indirect inguinal hernia. The ovary was not explored, however she underwent an open inguinal hernia repair with the aim of preventing recurrence. A small direct inguinal hernia was plicated, an indirect hernia sac was identified and empty on examination, this was suture ligated. Interestingly, a small defect in the external oblique aponeurosis was noted, 2 cm above the inguinal ligament corresponding to the area of maximal tenderness was palpated. Mesh was used to cover both the defect in the external oblique aponeurosis and internal inguinal ring.

The patient described relief from her pain and was discharged on day three of admission following an uncomplicated post-operative course. A repeat pelvic ultrasound one week post discharge demonstrated the right ovary in the pelvis with good vascularity.

Inguinal hernias containing female adnexa are rare and occur in 3% of inguinal hernias. Furthermore, they usually occur in the paediatric population or are associated with genital tract anomalies in

women. Multiparity may be a risk factor. Early diagnosis with the assistance of Doppler ultrasound may prevent complications such as torsion and infertility. Nonetheless, repair of the hernia may be important for symptom management and prevention of recurrence.

Figure 1

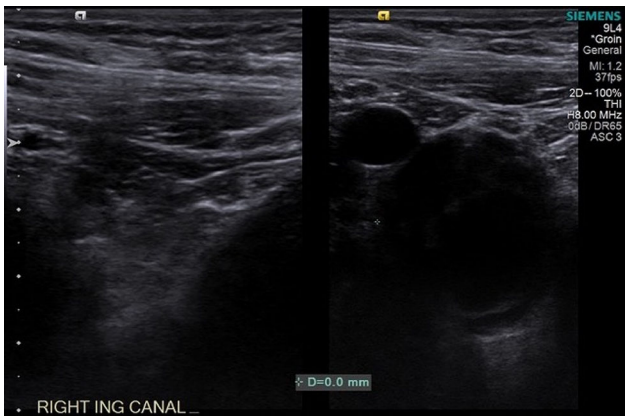


Figure 2

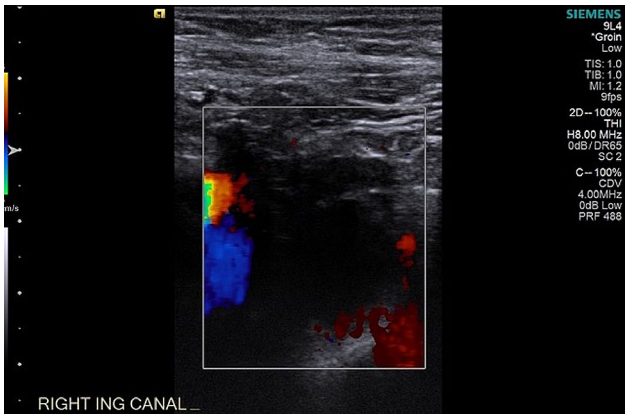
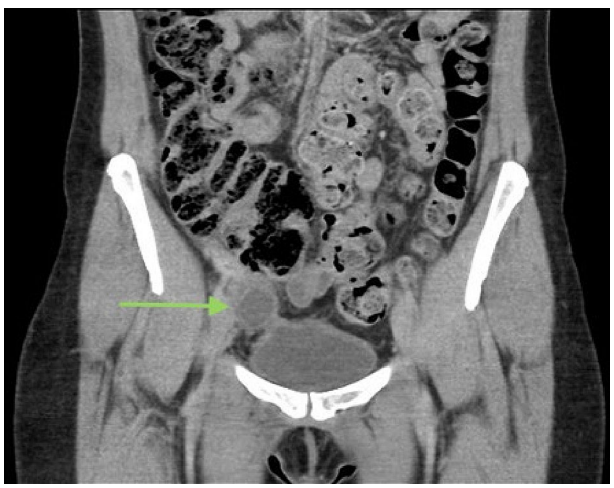


Figure 3



P004

Predictors of Post-Operative Length of Stay After Robotic Tapp Inguinal Hernia Repair

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Introduction: Minimally invasive transabdominal preperitoneal (TAPP) inguinal hernia repair is performed as a well-tolerated outpatient procedure. Common complications including postoperative urinary retention (POUR) and pain can result in extended length of stay (LOS), and increased costs. Investigating predictors of extended LOS may highlight targetable areas of improvement in peri-procedural protocols.

Methods and Procedures: We performed a retrospective observational study, reviewing all patients at a single 625 bed community-based hospital undergoing robotic TAPP inguinal hernia repairs between January 2018 and December 2019. Data points collected including patient sex, age, race, BMI, intraoperative Foley placement, unilateral vs bilateral repair, paralytic reversal agents, local/regional anesthetic type and dose, and duration of surgery. The primary outcome measured was PACU LOS. A multivariate analysis was performed to determine which factors had a significant correlation with increased PACU LOS.

Results: We identified a total of 491 patients meeting inclusion criteria. The median length of stay following surgery was 326 min (25%-75% IQR: 277 -417). Of the variables studied, intraoperative use of a Foley and bilateral hernia repair significantly increased the time spent in the PACU. Patients undergoing a bilateral repair had increased LOS by 134 min. Patients who received Foley catheterization intraoperatively had increased LOS by 93 min. 9 patients required postoperative catheterization.

	N = 491	P-value
Male (%)	444 (90)	0.654
Average Age (SD)	63 (14)	0.268
Average BMI (SD)	25.6 (3.7)	0.234
Intraop Foley (%)	**184 (37)**	**0.015***
Intraop Glycopyrrolate (%)	102 (21)	0.883
Regional Anesthesia (%)	332 (68%)	0.233
Adj. mL of Local (SD)	32 (21)	0.355
Bilateral repair (%)	**193 (39)**	**0.001***
Sugammadex reversal (%)	466 (95)	0.688

Conclusions: Bilateral hernia repair likely extended length of stay due to increased pain. Intraoperative Foley completely empties the bladder, and may also be correlated with patients who have BPH and baseline voiding difficulty. Only a small fraction of patients required postoperative catheterization. The current protocol of awaiting trial of void after minimally invasive IHR may prove unnecessary.

P005

Robotic repair of large inguinoscrotal hernias: a single institution experience

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Introduction: While many inguinal hernia repairs are amenable to a minimally invasive approach, a scrotal component makes the operation substantially more difficult. This is due to the greater complexity of dissection, difficulty of reducing hernia contents, and large size of the abdominal wall defect. Due to these factors, many surgeons will only offer open repairs for these complex hernias. We present our single institution experience with robotic-assisted repair of large inguinoscrotal hernias.

Methods: A retrospective chart review was completed for all male patients who underwent elective robotic-assisted inguinoscrotal hernia repair at our quaternary academic center from July 2018 through July 2021. Inguinoscrotal was defined as the presence of hernia contents within the scrotum as documented in the surgeon's physical exam or operative report. Baseline demographics and perioperative outcomes were reviewed.

Results: Thirty-six patients with an inguinoscrotal hernia underwent robotic-assisted hernia repair. Mean age was 62 years old (range 25–85 years old) and the mean BMI at initial clinic visit was 29.3 (range 18.5–51.2). Ten patients (28%) had a recurrent hernia with prior repair, with three of these patients having undergone two prior repairs. Many patients underwent multiple procedures during the same operation, including 12 bilateral inguinal hernia repairs (33%) and 4 ventral hernia repairs (11%). The inguinoscrotal hernias were often complex and contained significant abdominal contents including small bowel (39%), large bowel (39%), or bladder (11%). Drains were placed intraoperatively in 7 patients (19%). Mean OR time was 197 min (range 91–395 min). Most patients were discharged the day of surgery (n = 13, 36%) or postoperative day 1 (n = 21, 58%). Nineteen patients (53%) had a surgical site occurrence (17 seroma, 2 hematoma), three requiring procedural intervention (1 bedside aspiration, 2 operative hematoma evacuation). Surgical drain placement was not significantly associated with seroma formation ($p = 0.56$). Both patients who developed hematomas were on therapeutic anticoagulation; additionally both had surgical drains that were monitored prior to resumption of anticoagulation. There were no surgical site infections within 30 days. Two patients had early hernia recurrences, one at one week postoperatively in setting of large hematoma and one at 3 months, both of which required urgent intervention.

Conclusion: From our experience, using the surgical robot is a feasible approach to repairing large inguinoscrotal hernias. There were no surgical site infections in our cohort, and the majority of surgical site occurrences were seromas that resolved spontaneously.

P006

Early Experience and Technique for Concomitant Minimally invasive Abdominal Operations with Robotic Retro-Muscular Hernia repair eTEP

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Introduction: Recent evidence of the safety of microporous mesh in contaminated fields has allowed for an explosion of collaboration across surgical specialties. This has allowed for open repair of retromuscular hernia simultaneously with other open abdominal operations. No reports exist of combined minimally invasive retromuscular hernia repair and other abdominal operations. This article will describe our technique and early experience with minimally invasive abdominal organ resection performed concomitant with robotic-assisted retromuscular hernia repair utilizing extended total extraperitoneal repair (eTEP) technique.

Methods: A total of five cases are presented in this case series including minimally invasive ovarian cystectomy, hysterectomy, hysterectomy with bilateral salpingo-oophorectomy, nephrectomy, and cholecystectomy with ureteral stone extraction. These patients had symptomatic hernias that were deemed to be amenable to robotic repair with eTEP technique. All cases were female, average age was 57.4 years old, and average BMI was 37.5. Comorbidities included diabetes, smoking, hypertension, obesity, and polycystic ovarian syndrome. Ports from the index operation were left in place to vent and prevent pneumoperitoneum during the retromuscular dissection. We performed standard top down eTEP approach in all cases, extraperitonealizing the previous ports as encountered. Hysterectomy specimens were retrieved via vagina. The renal specimen was kept in an endo-catch bag in retromuscular space during the eTEP dissection before removal via a small midline incision in hernia defect. Kidney stones were removed through urinary system and gallbladder through port site prior to hernia repair. The average length of operation was 279 min, average length of hospital stay was 1.8 days, and average blood loss was 9.2 mL. No complications were noted during the hospital stay or post-operative phase.

Discussion: It is our experience that eTEP incisional hernia repair can be performed simultaneously with other minimally invasive operations safely and without significant added morbidity. This technique allows for a completely minimally invasive approach to minimize surgical pain, length of hospital stay, and morbidity. The main challenges that we faced were port placement, patient positioning, and specimen extraction, which can be overcome with close collaboration amongst surgeons. In our early experience, the hernia repair did not appear to add any hospital days or wound morbidity, although patients did report more abdominal wall pain.

Conclusion: Combined surgical procedures with robotic-assisted eTEP VHR procedures is feasible without increased morbidity or post-operative complications. This allows for a completely minimally invasive approach, while eliminating the need for multiple operations and hospitalizations.

P008

Robotic Abdominal Wall Hernias Treatment—Initial Experience—30 cases

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Abdominal wall hernias represent a common condition in surgical practice. They may present as simple or sometimes extremely complex cases. The laparoscopic surgical treatment is consecrated and widely used today with excellent results.

The advent of robotic surgery, or assisted by the robot, allowed the surgeon to use a more meticulous and ergonomic platform, which can bring advantages in the treatment of complex cases. The authors present their initial experience with abdominal wall hernias treated with the robotic platform.

Thirty procedures were performed. They consisted in 20 inguinal hernias and 10 ventral hernias (incisional ones). We used our routine surgical technique in all cases.

All the procedures were performed without any intraoperative intercurrences. All patients were discharged the day after the procedure was done.

The most important characteristic observed was the significant decrease in postoperative pain.

We conclude that this is a promising and safe method for the treatment of abdominal wall hernia cases.

P009

Laparoscopic Ventral Hernia Repair with Biodegradable/Porous PTFE Composite Mesh: A Single Institution Experience

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Background. In treating ventral hernias, the paradigm shift to a minimally invasive mesh repair has led to significant reduction of recurrence rates, as well as perioperative complications. Today, minimally invasive ventral hernia repairs remain the standard of care for ventral hernias. While multiple studies have looked at different types of mesh for ventral hernia repairs, there remains no clear benefit to using one type over another. We present our experience using a composite mesh of a biological matrix, BIO-A web scaffold and macroporous, monofilament PTFE (GORE Synecor) to add to the existing literature.

Methods. We retrospectively reviewed the outcomes of all patients who underwent laparoscopic hernia repairs in our institution from March 2017 to September 2020 using Synecor mesh. Our technique involves primary fascial closure and Intraperitoneal Onlay Mesh (IPOM) placement with endoscopic component separation when indicated. We evaluated patient demographics, operative parameters, morbidity, follow-up time, and recurrence.

Results. We collected a sample of 74 patients, 35 females and 39 males, with mean age of 55.2 years (23–76). Our average BMI was 32.9 (21.6–51.9) with 23 patients (31.1%) having a BMI $>$ 35. 51 patients (68.9%) had incisional hernias with an overall mean size of 6 cm in largest diameter (1.5–11). The mean operative time was 91 min (38–204) with average length of stay of 1.6 days (1–13). The average follow-up time was 12.2 months (0–37) with 13 patients (17.5%) having at least 24 months of follow-up. Only 5 patients (6.7%) were found to have recurrent hernias on follow-up. Other complications included 2 infections, 2 seromas, temporary abdominal wall neuralgia in 3 patients, aspiration and ventilator requirement in 1 patient as well as 1 patient with extended post operative ileus requiring TPN. This results in a 12.1% perioperative complication rate. Interestingly, both mesh infections were managed without mesh removal with long-term resolution of infection as well as no recurrence at 29 months in one patient where the other was lost to follow up after 1 month. There were no deaths.

Conclusion. Our results show that Synecor mesh is a safe and durable mesh. This is seen even in morbidly obese patients. In very limited data, other encouraging results were that we were able to treat 2 different mesh infections without mesh removal or hernia recurrences.

P010

Encouraging early results of robotic Inguinal hernia repair: First western Indian experience

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Objectives: Robotic surgery adds ergonomics, a 3D high-defination camera and articulating instruments overcoming some laparoscopic limitations. Abdominal hernia repair is always difficult task in laparoscopy as there is need to do suture tangential to scope. We aimed to report the outcomes of the early experience of over 26 robotic transabdominal preperitoneal (TAPP) inguinal hernia repair performed by a surgical unit from western India.

Methods: A retrospective review of a prospective maintained database was conducted in patients submitted to robotic transabdominal preparitoneal (TAPP) inguinal hernia repairs between June 2019 and June 2021. Preoperative demography, intra operative outcomes and post operative results were reviewed.

Results: Review identified 26 patients submitted to robotic TAPP inguinal hernia repair. Twenty two patients had bilateral hernia while four had recurrent unilateral hernia. Mean age was 56 years, with median BMI of 24.9 kg/m2. Mean console time was 65 min (range 40–150). Over the time console time reduced. Mesh was fixed in all procedures using sutures and no tackers were used. Mean post operative pain score was 4. All patients were discharged by 24 h of stay. Clevian Dindo grade 1 low grade complications were noted. No recurrence was seen after a mean follow-up of 90 days.

Conclusions: This study represent to-date the first western Indian case series of robotic TAPP inguinal hernia repair. Our review indicate that robotic assisted TAPP inguinal hernia repair appears to technically feasible and safe. In bilateral and recurrent inguinal hernia robotic repair achieves good outcomes and quality of life.

P011

Retrospective Outcomes Analysis of Combined Robotic Assisted Inguinal Hernia Repair and Prostatectomy

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Introduction: Inguinal hernias are a common occurrence in patients undergoing robotic prostatectomy, with anywhere from 10–30% incidence reported. Both prostatectomy and inguinal hernias are routinely addressed in a robotic fashion, and while working in similar operative field, both have the potential to be addressed during the same surgery. There have been few small case series looking at concurrent robotic prostatectomy and inguinal hernia repair, all of which demonstrate no additional risk of complication or morbidity. The purpose of this study is to review overall outcomes and feasibility of combined robotic prostatectomy and inguinal hernia repair at our institution with a single urologist and single general surgeon. We aim for this data to add to the growing body of literature regarding the subject.

Methods and procedures: An IRB approved retrospective outcomes analysis was performed evaluating concomitant robotic assisted inguinal hernia repair and prostatectomy between 2017 and 2020. Cases examined were performed by a single general surgeon and single urologist. All repairs were performed in a similar transabdominal preperitoneal fashion with Covidien ProGrip^{TM} mesh. Data regarding age, hernia type, combined time in OR, length of stay, and complications noted at initial post-operative appointment were analyzed.

Results: A basic statistical analysis was performed on eight patients undergoing robotic assisted prostatectomy with pre-operatively identified inguinal hernias. These included three right sided inguinal hernias, two left sided, and three bilateral inguinal hernia repairs. Three cases were recurrent hernia repairs. The average age was 64.5 years (range 55–71 years). Mean time in OR was 228.4 min (range 208–265 min). Length of stay for all cases was one day. Two patients had postoperative seromas, both of which were resolved by the second follow up appointment. There were no postoperative infections identified.

Conclusions: Concomitant robotic prostatectomy and inguinal hernia repair with mesh is a feasible surgical option with minimal complications. All patients were appropriate for discharge on postoperative day one. The only postoperative complication was seroma formation in 25% of patients (two of eight) which were resolved at subsequent follow up visits. This case-series demonstrates that this combined approach is safe and easily performed in appropriate patients which can avoid the cost and complications of multiple separate procedures.

P013

Primary SAC Abandon Technique: Is it a Safe Way to Endoscopically Treat Inguinoscrotal Hernias?

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Introduction: Laparoscopic inguinal hernioplasty is widely accepted as a viable alternative to open hernioplasty. However, the ideal management of inguinoscrotal hernias remains controversial. The extensive dissection required to fully reduce the hernia sac is associated with an increased risk of injury to cord structures, testicular ischemia, hematoma, and seroma. The rates of seroma formation are reported as high as 66% in some inguinoscrotal hernia series. An alternative technique, primary abandon-of-the-sac (PAS), was recently described in the literature in which the hernia sac is divided at the level of the internal inguinal ring and left in situ prior to dissection of the myopectineal orifice and mesh placement. We present our initial experience with the PAS modification to transabdominal preperitoneal hernioplasty (TAPP), comparing these patients to another group in whom the hernia sac is abandoned distally late in dissection due to difficulty in safely isolating it from cord structures.

Methods and Procedure: Data are collected in a prospectively managed database documenting age, gender, BMI, comorbidities, tobacco use, operative and post-operative results. Patients were followed in surgery clinic to assess post operative outcome.

Results: Eight male patients with inguinoscrotal hernia underwent laparoscopic TAPP repair between January 2021 and September 2021. Four patients were in the PAS group with an average BMI of 28.3 and operative time of 136 min. In the other half of the patients the distal sac was abandoned when complete safe dissection to isolate the sac from cord structures was not possible. This group had an average BMI of 27.5 and an average operative time of 142 min. In this small series there were no cases of neuralgia, hematoma, or injury to cord structures. In a follow up period ranging from 2 to 20 weeks none of the PAS group patients developed a seroma post-operatively. In contrast, 75% of the distal sac abandon patients developed a seroma and all of them had prolonged post operative pain requiring extra narcotics and loss of work. These patients were managed conservatively.

Conclusion: Further research is needed to determine the true risk of complications and long-term outcomes associated with the PAS technique before it can be widely applied in practice. In our small case series, the technique appears safe and reproducible with significant lower risk of post operative seroma and its associated symptoms.

P015

A Novel Hybrid Approach to the Repair of Flank Hernias

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Introduction: Flank hernias are uncommon and challenging hernias to repair. Discussion of flank hernia repair is relatively scarce in the literature. We present a novel approach to repairing flank incisional, traumatic, and denervation hernias with a "hybrid" approach utilizing an open repair in conjunction with the robotic platform for laparoscopic intraperitoneal mesh fixation.

Methods: A retrospective analysis was conducted on all patients who received a combination open and robotic "hybrid" repair from April 2014 through January 2020 by a single surgeon. Patient and hernia characteristics, operative techniques, and outcomes were evaluated. Each patient underwent a similar operation with an intraperitoneal mesh as well as an onlay mesh. Minor technique changes including subcutaneous quilting and wound vac placement which were developed over time and compared for outcome results.

Results: Twenty-five patients were included in the study. Mean age was 58.8 ± 13.2 years with similar distribution of sex (52.0% men). 64.0% of patients were obese with a body mass index of 30 or greater, 24.0% of patients were diabetic, and 48.0% suffered from chronic pain preoperatively. Average hospital length of stay was 4.3 days. Outcomes analyzed included wound infection (8.0%), seroma formation (16.0%), hematoma formation (12.0%), mesh infection (0.0%), weight gain (16.0%), hernia recurrence (4.0%), reoperation (12.0%), and chronic pain (25.0%). When compared to the drain placement group, quilting of the subcutaneous tissue was more likely to result in seroma (17.6% vs 12.5%, P = 0.618) and hematoma (17.6% vs 0.0%, P = 0.296), although this did not reach statistical significance. Use of negative pressure wound vac did not impact the incidence of wound infection (12.5% vs 6.2%, P = 0.565), seroma (12.5% vs 17.6%, P = 0.618), or hematoma formation (12.5% vs 11.8%, P = 0.704), when compared to no wound vac placement.

Conclusion: The "hybrid" repair represents a novel approach to flank hernias. Improved visualization of the intraperitoneal portions of the operation using the robotic platform allow for accurate mesh fixation. In experienced hands, this novel approach provides safe and satisfactory outcomes.

P016

Laparoscopic umbilical hernia repair with Su2ura® Approximation Device

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Introduction: This study was performed to assess the safety and efficacy of the Su2ura® Approximation Device, a newly developed instrument for the approximation of soft tissue defects, investigated here for laparoscopic closure of primary umbilical hernia defect with intraperitoneal mesh placement (IPOM).

IPOM for primary umbilical hernia repair is a well-established laparoscopic method for the treatment of this pathology. Suturing of the defect during a laparoscopic procedure is challenging and requires skills to be earned over many repetitive procedures before making such surgery short and effective.

The Su2ura® Approximation Device was used in this first-in-human trial to simplify the closing of the umbilical hernia defect. The safety and efficacy of this device during umbilical hernia repair were assessed.

Methods and Procedures: A prospective, multi-center, single-arm study was conducted. Patients aged 18 and more, with BMI comprised between 20 and 40 and with hernia defects of up to 5 cm were enrolled.

The first ten patients who completed a six-month postoperative follow-up underwent standard laparoscopic umbilical hernia repair, during which the Su2ura Approximation Device was used for closing the defect after which a mesh was fixated. The safety endpoints were the overall rate of serious adverse events and serious adverse device effects up to hospital discharge and up to the 60th post-operative day. The efficacy endpoints were assessed up to 6 months follow-up by measuring the hernia recurrence rate, the patient satisfaction, the clinical bulging, and the evidence of seroma.

Results: Patients presented with a defect size ranging in diameter between 0.5 cm and 5 cm; 2 patients also presented with diastasis. All 10 umbilical hernia repairs were successfully completed with the Su2ura® Approximation Device, and surgeries were performed as per protocol. No patients suffered hernia recurrence, clinical bulge, or seroma. All patients reported good Quality of Life, significant improvement in pain-related parameters, and daily and sports-related activities. By six months post-surgery, none of the patients felt restricted in their daily activities. Most patients reported improvements in the shape of their abdomen.

Conclusions: These preliminary results indicate the safety of the Su2ura® Approximation Device when used in standard laparoscopic hernia repair surgery, and its efficacy when approximating primary defect prior to mesh fixation.

P017

Feasibility of TAPP repair for epigastric and subcostal hernias

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Introduction: Despite high prevalence of midline hernias among ventral and incisional hernias still lateral epigastric and subcostal defects need to be frequently repaired. Mesh implantation via open approach, although necessary in recurrence prevention, may be troublesome mainly due to a proximity of a costal margin, therefore lack of durable tissue margin allowing a strong mesh fixation. Some of these limitations may be reconciled by transabdominal-preperitoneal repair (TAPP). The technique known mainly from inguinal repairs may be successfully applied for subcostal defects, although one should take into consideration some additional technique aspects of this repair, i.e. a thin and fragile peritoneum layer, difficult dissection of scar tissue, entering a subdiaphragmatic plane and defect closure with permanent self-locking suture.

Aim: The aim of study was to assess the feasibility, safety and efficacy of a laparoscopic TAPP repair for the lateral epigastric and subcostal hernias.

Methods: An analysis included 14 adult patients undergoing an elective surgery for the incisional subcostal or lateral epigastrium hernia between September 2019 and August 2021. Ninety days and one year after discharge, all operated patients provided information on the results of treatment via a telephone questionnaire. The primary outcome of a treatment was the presence of a recurrence. Patients who suspected a recurrence or felt a thickening/bulging in the wound were additionally subjected to physical examination by a doctor and sonographic examination. Additionally, the presence of pain was assessed as secondary treatment outcome, using a numerical scale.

Results: The mean width of defect was 46.5 ± 14 mm and length 64.2 ± 23 mm. The operation time was 123.1 ± 21.6 min. It was possible to place a large area of synthetic mesh 164.2 cm2. After 3- and 12-months follow-up, there was no recurrence nor bulging at the defect site. There was no chronic pain in the analyzed group of patients.

Conclusions: TAPP technique in subcostal hernia repair allows for placement of a much larger mesh than an anterior approach surgery, and is closer to current recommendations, especially for patients with additional risk factors, i.e. obesity. TAPP allows a mesh to be introduced into preperitoneal space, allowing to avoid direct contact between mesh and intestines, providing wide mesh overlap above costal margin in subdiaphragmatic plane. Laparoscopic subcostal TAPP is feasible and safe, and may be considered as an alternative for open approach methods.

P018

Evolutions in Complex Hernia Repair: A Retrospective Review of Twelve-Year Experience at a Large Tertiary Referral Center and Lessons Learned

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Introduction: Complex ventral hernias, defined by size, location and reoperation, lead to significant morbidity and reduction in quality of life. Despite the many repair options – with variations in type of mesh, components separation, and staging operations—there remains no consensus on operative standards. Thus, we aimed to describe the experience of a single surgeon at a tertiary referral center with complex hernia repairs.

Methods and procedures: We performed a retrospective analysis of complex hernia repairs from 2009–2021 using ICD codes for incisional or ventral hernias with/without obstruction and gangrene, as well as muscle separation-nontraumatic. We excluded all inguinal hernias, primary repairs, or small mesh repairs (< 7 cm). We analyzed patient baseline health characteristics, hernia characteristics, operative technique, intraoperative findings, and post-operative course.

Results: We analyzed a total of 86 patients with characteristics in median [interquartile range] as follows: age 60 years [54–69], initial clinic BMI 31.1 kg/m2 [27.2–34.8], and immediate pre-operative BMI 30.0 kg/m2 [26.5–32.8]. Past medical history demonstrated 27.9% prior smokers, 26.7% diabetics, 7.0% active use of blood thinners, and 2.4% active use of immunosuppression. Past surgical history identified 31.8% had a previous hernia repair, 96.6% of those with mesh.

Median hernia defect size was 51.4 cm2 [19.3–105.1]. Hernias were located 39.5% central abdomen, 24.4% suprapubic, 18.6% flank, 16.3% subxiphoid, and 7.0% parastomal; 51.2% of patients had multiple fascial defects. Staged repairs accounted for 9.3% of cases. Regarding operative technique, the majority were 39.5% Stoppa, 23.3% Stoppa + anterior component separation (ACS), 14.0% Stoppa + transversus abdominus release (TAR), and 11.6% intraperitoneal repairs. Joint faculty cases comprised 65.1% (80.4% plastic surgery, 17.9% urology, 1.8% gynecology). Regarding mesh type: 66.3% was polypropylene, 22.1% biologic, and 10.5% synthetic absorbable with median mesh dimension 26 cm length [20–35] by 20 cm width [15–27]. Fixation was performed with 17 [14–19] sutures.

Follow-up care demonstrated 34% (29/86) had a complication. Absolute complications rates were 17.4% wound infections and 8.1% recurrence. Mesh infection, UTI, pneumothorax, transfusions, VTE, and fistulas were rare at 0–2.3%. Length of stay was 6 [5–7] days and clinic follow-up extended to 176 [48.5–467.5] days post-operatively.

Conclusions: Despite the lack of complex hernia repair standards, at our high-volume referral institution we have identified personal practice standards with acceptable complication rates that may serve to guide the hernia community. These include retrorectus mesh placement with ACS/TAR, wide bony overlap, extensive fixation, and combined specialty operations.

P019

Ventral Hernia—Surgical Treatment with Robotic Platform, First 10 cases

Reinaldo M Oliveira Neto, MD, FACS; Carlos R Puglia, MD; Paulo R Corsi, MD, FACS; Hospital Samaritano Higienópolis—United Health Group

Among the abdominal wall hernias, ventral hernias represent an important and common part of daily surgical practice. It can range from small umbilical hernia to large and complex incisional hernals, which can cause severe physical disabilities to patients and even potentially life-threatening complications.

Among the techniques used, surgeons have a range of open or laparoscopic procedures, withor without the use of prostheses, with the most different results.

The robotic platform provided the surgeon with a meticulous and detailed technique through fine movements and three-dimensional vision of high definition, besides a veryfavorable ergonomics.

Within the authors' initial experience with the roboticplatform, we performed some cases of ventral hernias. Our initial experience consisted of 10 cases of patients with ventral hernia. Of these, 9 patients had complex incisional hernias and 1 patient had an important endometriotic lesion of the anterior musculature, associated with hernia in a previous c-section scar. All patients underwent robotic surgical treatment without complications.

Some patients underwent a plastic procedure on the same operation with great results.

We Used suture to perform the fixation of the mesh in all cases. All patients were dischargedthe day after the procedure.

The patients evolved without complications and with amarked decrease in postoperative pain.

We observed that the superiority of therobotic platform for performing the surgical procedure was striking. We concludethat, although still in initial experience, the robotic platform is extremely promising for the treatment of complex ventral hernias.

P020

Peripheral Nerve Block Reduces Post-operative Pain and Narcotic Use in Robotic Inguinal Hernia Repair

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Introduction: Robotic inguinal hernia repair is becoming an increasingly common procedure. The efficacy of peripheral nerve block for reducing post-operative pain and narcotic use has been demonstrated in open and laparoscopic repair, but not in robotic repair.

Methods: Data from 159 consecutive patients who underwent robotic inguinal hernia repair was retrospectively reviewed. All patients were over 18 years old and had mesh placed at the time of surgery. One patient was excluded for conversion to an open procedure. 135 non-block patients and 23 block patients were included. The block patients were further divided into transversus abdominus plane (TAP) and rectus sheath (RS) groups.

Results: The block and non-block groups were similar in terms of demographics, comorbidities, and hernia characteristics. Compared to non-block patients, block patients had a longer anesthesia time (43.65 ± 6.17 vs 39.98 ± 7.47 min, $P < 0.0001$), but shorter room time (108.8 ± 19.71 v 128.0 ± 27.34, $P = 0.0009$), despite the block patients being more likely to require lysis of adhesions (OR = 55.15 [11.12 – 239.6), $P = < 0.0001$). Block patients had less pain at the time of discharge from the post-anesthesia care unit (PACU) (0.4783 ± 1.082 v 0.7941 ± 1.612, $P = 0.4665$) and required fewer milligram morphine equivalents (MME) on the day of surgery (1.184 ± 1.90 v 1.984 ± 2.56, $P = 0.2465$), although neither measure was statistically significant. Comparing TAP and RS block patients, the TAP patients used significantly fewer MME on the day of surgery (0.63 ± 1.09 v 5.967 ± 4.803, $P = 0.0031$). Comparing only the TAP block group to the non-block group, TAP patients again had less pain at the time of discharge from the PACU (0.2941 ± 0.85 v 0.7852 ± 1.61, $P = 0.2501$) and used fewer MME on the day of surgery (0.63 ± 1.09 v 1.984 ± 2.56, $P = 0.063$). These measures failed to meet statistical significance.

Conclusion: This retrospective review suggests that TAP block is superior to RS for robotic inguinal hernia repair. Although no statistically significant differences between TAP and non-block patients was observed, the data does suggest that TAP provides some benefit. In addition to including a larger number of block patients, collection of pain scores, activity scores, and narcotic usage beyond they day of surgery would improve the utility of this data.

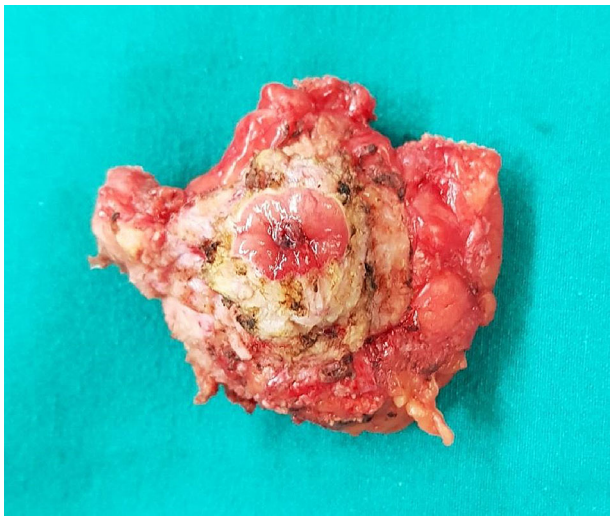
P021

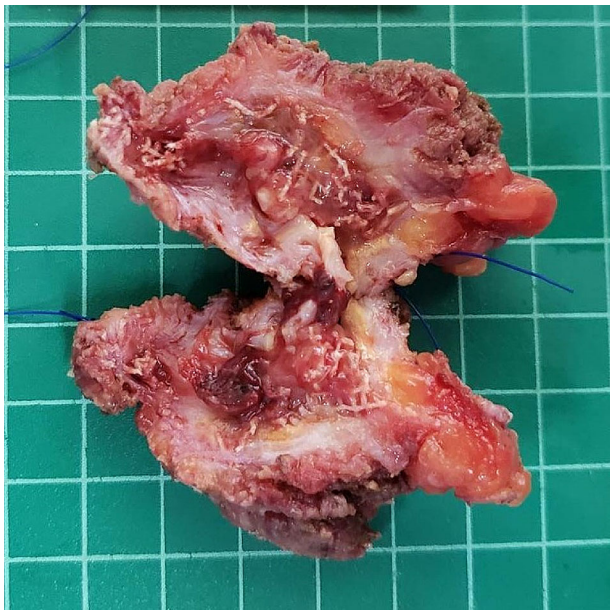
Mesh Granuloma with Bladder Invasion After Total Extra-Peritoneal Hernia Repair: Case Report

Mana Sirapat, MD; Setthasiri Pantanakul, MD; Nattawut Chiemchaisri, MD; Panot Yimcharoen, MD; Bhumibol Adulyadej Hospital

Introduction: In current practice, inguinal hernia repair is one of the most commonly elective surgical procedure performed internationally. Herniorrhaphy with non-absorbable mesh reinforcement has become the standard of procedure according to multiple hernia society guidelines. The surgical technique can be done openly and endoscopically. Totally extraperitoneal (T.E.P.) repair of inguinal hernia is one of the familiar endoscopic techniques practiced. After reduction of the hernial sac, a non-absorbable mesh is usually placed at the inguinal area in the preperitoneal layer to strengthen the myopectineal orifice of Fruchaud. The synthetic mesh activates immunologic response to the foreign body. The macrophage, T-cell, and fibroblast play a significant role in forming the fibrous layer over the mesh. However, the synthetic mesh can cause undesirable effects, such as infection, foreign body sensation, mesh granuloma, and rarely mesh-related visceral organ complications. The etiology and risk factors of granuloma formation are yet to be identified. In this study, we report a case of mesh granuloma with bladder invasion after totally extraperitoneal repair of inguinal hernia.

Case presentation: A 27-year-old male presented at the outpatient department due to gross hematuria and persistent pyuria for 2 weeks. He had a history of totally extraperitoneal repair of left inguinal hernia 8 years ago. A three-centimeter mass could be palpated at suprapubic area on physical examination. The CT of the abdomen demonstrated a 3.1 × 2.8 × 2.5 cm. lobulated enhancing soft tissue mass. The mass was located just beneath the left pyramidalis muscle, left rectus muscle, and obscured the medial part of the previous non-absorbable mesh. It also attached to the left superolateral wall of the urinary bladder. Five metallic tackers were demonstrated on the CT scan located distantly from the mass. An open excision was performed due to the foreign body granuloma formation. The pathological report showed foreign body granuloma, surrounding on the surgical mesh with secondary abscess formation and fistula tract extending through the urinary bladder.





Immunohistochemistry showed a composition of CD68 + cells (macrophage) and CD138 + cells (plasma cell) predominantly. Other inflammatory cells including T-lymphocytes (CD4 + and CD8 +), B-lymphocytes, and granulocytes are also found scattering in the lesion.

Conclusion: Granuloma formation and visceral organ involvement are rarely found after a synthetic mesh placement. The macrophage, B-cell, and T-cell are essential in granuloma formation despite the limitation of the etiology, mechanism, and risk factors.

P022

A Lucky Streak—2 Cases of Vermiform Appendix in a Port Site Hernia Within 2 Years

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Introduction: Port site hernias (PSHs) are a well-known potential complication after laparoscopy. PSHs containing vermiform appendix are a rare variant of PSHs, which only have been reported a few times. We present 2 cases of PSHs containing vermiform appendix.

Case Reports: Case 1. A 38-year-old woman was referred to us with right iliac fossa pain and elevated inflammatory markers. She previously underwent a diagnostic laparoscopy 13 months prior to this admission for suspected diagnosis of endometriosis, which was ruled out. Given strong suspicion of appendicitis, a diagnostic laparoscopy was performed. The vermiform appendix was found in a small hernia at the previous site of the 5 mm trocar in right iliac fossa. The hernia was reduced and appendectomy under antibiotic prophylaxis was performed. The defect in the abdominal wall was closed laparoscopically with a non-absorbable suture. The postoperative course was uneventful. The patient remains asymptomatic 12 months after surgery with no evidence of recurrence.

Case 2. A 78-year-old male was referred to us with a right iliac fossa hernia at the site of the 10 mm port, 4 years after laparoscopic low anterior resection due to sigmoid carcinoma. The CT revealed the vermiform appendix in the hernia sac and adhesions especially in the right iliac fossa. The patient was an ex-smoker with ASA2 and BMI 32.5. We therefore performed a small open hernia repair with antibiotic prophylaxis. The appendix and the hernia sac were removed, the hernia defect was closed with non-absorbable sutures and fascia was reinforced with an onlay Prolene mesh. The postoperative course was uneventful. The patient remains asymptomatic at 36 months after surgery with no symptoms of recurrence.

Conclusion: Port site hernias containing vermiform appendix appear to be a rare occurrence according to literature. We present 2 cases occurring less than 2 years apart.

P023

Emergent Robotic Incarcerated Large Scrotal Inguinal Hernia Repair

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Background: Large scrotal inguinal hernias represent a challenging surgical pathology. Although minimally invasive techniques have gradually expanded in the field of hernia repair, most surgeons elect the open technique for this type of hernia. The literature surrounding emergent robotic incarcerated large scrotal inguinal hernia repair (RSIHR) is scarce. We aim to present our results in a case series of robotic repair of large incarcerated scrotal inguinal hernia in an acute setting.

Method: We reviewed the charts of 4 patients undergoing emergent RSIHR from 2019 to 2021 at a single academic institution.

Result: All patients were male. The mean age was 55 (range 36- 80). The mean BMI was 32.4 (range 20- 55). All patients had at least one comorbidity with an ASA of 3 or 4. The mean operating time was 147 min (range 110- 220). Trainees (fellows, residents) involved in all cases. All patients underwent robotic transabdominal preperitoneal hernia repair (TAPP) with mesh, utilizing 4 arms for better retraction and reduction of the giant hernia. Division of conjoint tendon was performed in 2 cases to reduce the incarcerated content. There were 2 left and 2 right hernias. Hernia content was large and small bowel. We used permanent Pro grip and 3D max mesh with no fixation. 1 patient had remote open inguinal hernia repair with mesh on the same side as the recurrence. No conversion to open. No intra-operative complication. Mean follow-up was 7.8 months (range 0- 28). The mean length of stay was 4.6 days (range 0- 6) due to underlying medical conditions. No hematoma, seroma at follow-up. There was one recurrence at 2 month-follow-up first noticed immediately after the patient carried heavy material. The intraoperative finding appeared that the mesh placed previously gave way inferiorly for the site of recurrence. We performed ambulatory robotic TAPP repair with mesh for that early recurrence with no immediate complication. Patients reported a low level of pain postoperatively. No narcotics was given at discharge.

Conclusion: Incarcerated large scrotal inguinal hernias can be safely repaired using robotic-assisted TAPP methods with low morbidity and favorable outcomes.

P025

A Case of Aerophagia Leading to Compartment Syndrome Requiring Emergency Department Exploratory Laparotomy

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Introduction: For patients with chronic aerophagia refractory to behavioral modification or medical management, venting gastrostomy is the treatment of choice as a safe and feasible surgical option. It is recommended to avoid performing an exploratory laparotomy and instead pursuing NG or rectal decompression in patients presenting emergently with distension from chronic aerophagia. Herein, we report a case of aerophagia so profound it necessitated exploratory laparotomy in the Emergency Department for rapid resolution of abdominal compartment syndrome resulting in vascular and pulmonary compromise.

Emergency room events: The patient is a nineteen-year-old female with autism and developmental delay with chronic aerophagia since early childhood. patient was planned to receive venting gastrostomy tube placement in accordance with standard treatment for aerophagia refractory to medical or therapeutic management. On presentation she was tachycardic and tachypnic in obvious distress with a massively distended and tight abdomen. Plain films were obtained showing massively dilated loops of bowel (Fig. 1).

Attempts at rectal and nasogastric decompression were unsuccessful. Patient then became pulseless. Following ROSC the patient was paralyzed and intubated via RSI. Patient was presumed to be suffering from abdominal compartment syndrome with inability to expand lungs or move blood effectively with so much pressure from her distended abdomen and since she was peri-code, the decision was made to perform exploratory laparotomy in the ED prior to transport to the OR. Immediately following incision made with electrocautery, distended loops of bowel pushed out of the abdomen and her vitals immediately stabilized.

Discussion: 30% of patients with chronic aerophagia undergo unnecessary negative exploratory laparotomy for presumed obstruction. In this case, however, the patient presented with compartment syndrome forcing the more invasive procedure's immediate execution in order to save the patient's life.

Conclusion: To our knowledge, this is the first report of aerophagia producing a severe abdominal compartment syndrome requiring laparotomy in the ED. With a paucity of data for this presentation, successful treatment using an atypical method is described here for future discussion and use.

Keywords: Aerophagia, Abdominal Compartment Syndrome, Emergent Exploratory Laparotomy, Pediatric Surgery

P026

Gallbladder Perforation as an Isolated Injury Due to Penetrating Abdominal Trauma. Case Report

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Introduction: Single gallbladder injury due to abdominal trauma is rare. Early diagnosis is difficult because of the variability of symptoms and nonspecific imaging results. Prompt recognition of the injury reduces complications, while delayed diagnosis or inadequate management can have disastrous consequences.

Objective: Presentation of a case of traumatic gallbladder injury caused by a stab and literature review.

Materials and Methods: Review of a clinical case, using electronic medical history. For the literature review, Pubmed was used, specifically the terms Traumatic gallbladder rupture, Isolated gallbladder rupture, blunt and penetrating gallbladder trauma. Finding 19 articles: 14 single case reports, 2 case series and 3 literature reviews.

Case Report: A 29-year-old male patient, with history of drug abuse and alcoholism. Presented to the emergency department after receiving a stab wound in right upper quadrant. The patient was hemodynamically stable upon arrival. On physical exam, abdomen was depressible, with pain in right upper quadrant and a 3 cm penetrating abdominal wound.

Initial lab results revealed Hb 14.1 GB 23,900. CT revealed perforated gallbladder. Dense endoluminal (haematic) content and perivesicular contrast extravasation, probably due to active bleeding, and signs of diffuse peritonitis.

The patient was brought to the operating room for a laparotomy: 350 cc hemoperitoneum, distended gallbladder and fundus perforation with biliperitoneum were seen. No signs of active bleeding were identified, neither other injuries. Uneventful cholecystectomy was performed. Biopsy: laceration in fundus, necrosis and acute focal fibroleukocyte inflammatory infiltrate and intravesicular-intracystic blood material. Patient was discharge the 3rd day after surgery.

Discussion/Conclusion: Traumatic gallbladder injuries are rare. 3–5% of abdominal traumas have gallbladder injuries and 0.5% bile duct injuries. 85% due to penetrating trauma. The rarity of gallbladder lesion is attributed to its anatomy, since externally it´s protected by ribs and internally by liver, omentum and intestines. Gallbladder trauma can be classified as perforation, contusion, avulsion, and traumatic cholecystitis. Concomitant abdominal injuries are common. Risk factors: thin-walled gallbladders distended by fasting or alcohol.

Symptoms can be immediate, due to associated injuries, or insidious, when the only injury is bile leakage. Imaging diagnosis is exceptional since it has a low incidence, CT findings are really nonspecific and because it's usually a finding during laparotomy indicated by associated lesions. Although there are reports of conservative management in small contusions/avulsions or deserosions, the recommended treatment is cholecystectomy, because perforation of the free wall to the abdominal cavity causes biliperitoneum and may present late rupture due to ischemia.

P027

Bochdalek Hernia and Gastric Volvulus Misdiagnosed and Treated as Paraesophageal Hernia

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Introduction: Bochdalek hernia, a congenital defect of the left posterolateral aspect of the diaphragm, rarely presents in adults, especially when complicated by gastric volvulus. Due to the rarity of this condition there is potential for misdiagnosis or delay in care. The purpose of this report is to highlight timely diagnosis and appropriate minimally invasive repair of a symptomatic Bochdalek hernia in an adult.

Methods: A 31-year-old female acutely presented to another facility with dyspnea, chest pain, and vomiting. Computed tomography demonstrated a left posterolateral diaphragmatic defect consistent with Bochdalek hernia and gastric volvulus (Fig. 1). Unfortunately, laparoscopic hiatal hernia repair with Nissen fundoplasty and gastrostomy tube were performed. The left posterolateral diaphragmatic defect was not appreciated or repaired. The patient was discharged home but returned to our institution seven days later with recurrent dyspnea, chest and abdominal pain, tachycardia, and leukocytosis. Computed tomography again showed a left posterolateral diaphragmatic defect with herniated solid and hollow viscous organs as well as a partial obstruction of the large intestine (Fig. 2).

Results: An emergent robotic repair of a Bochdalek hernia was performed with reduction of contents, suture repair, and hernioplasty using DUALMESH®. Inspection revealed an intraperitoneal stomach, intact Nissen fundoplasty, and gastrostomy tube, which was subsequently removed, as well as a large Bochdalek hernia (Fig. 3) containing small intestine (Fig. 4), large intestine (Fig. 5), and spleen (Fig. 6). The diaphragmatic defect (6 × 8 cm) was repaired using non-absorbable, barbed suture then reinforced with DUALMESH® (6 × 10 cm) secured with non-absorbable suture and fibrin sealant (Figs. 7, 8, 9). The patient was discharged home after three days and free of symptoms at six months follow-up.

Discussion: Bochdalek hernia is most often diagnosed in newborns but may present with or without obstruction in adults. In this patient with acute gastrointestinal obstruction, initial missed diagnosis led to inappropriate management and delay in care. A high index of suspicion is critical to appropriately diagnose and manage adults with acute presentation of Bochdalek hernia. As illustrated by this case, a minimally invasive approach to Bochdalek hernia is feasible and safe; however, long-term outcome data are limited.

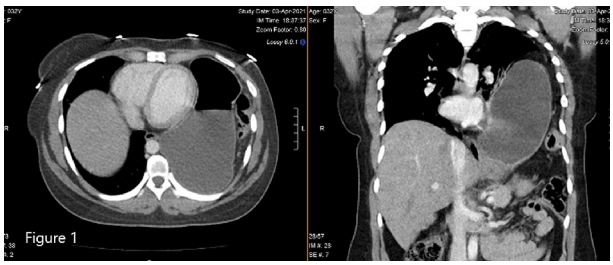
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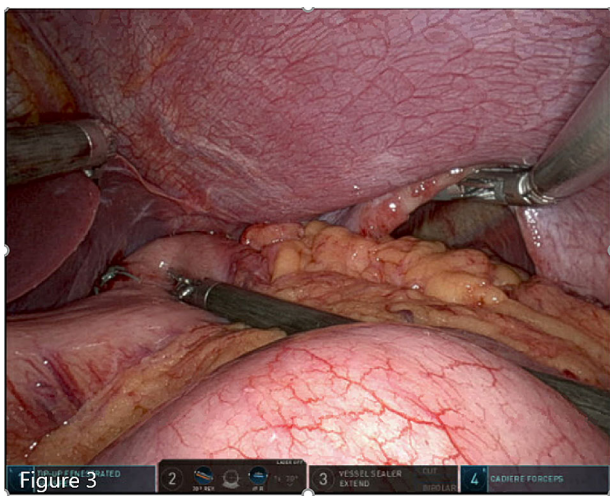
Figure 2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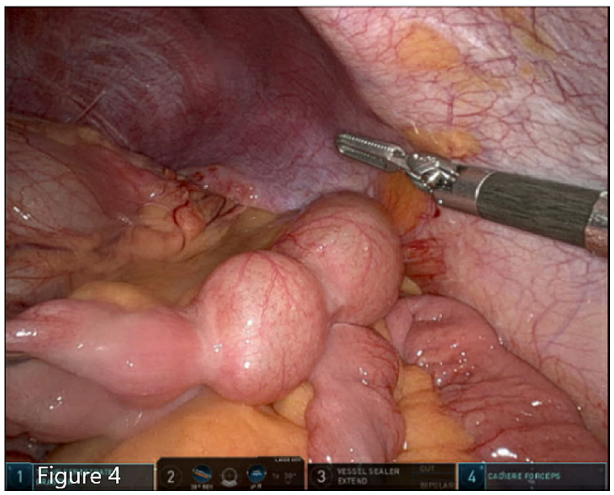
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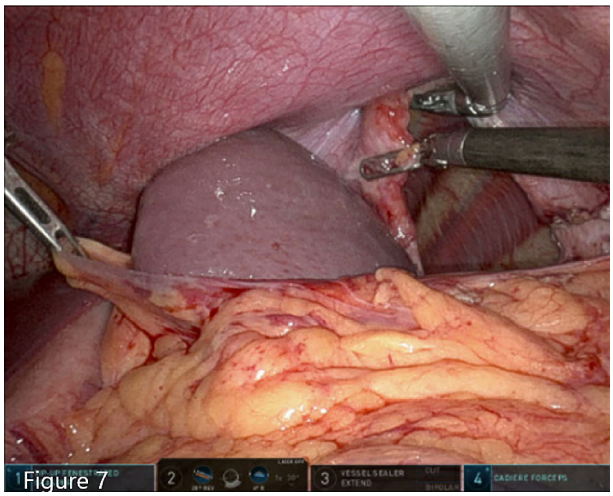
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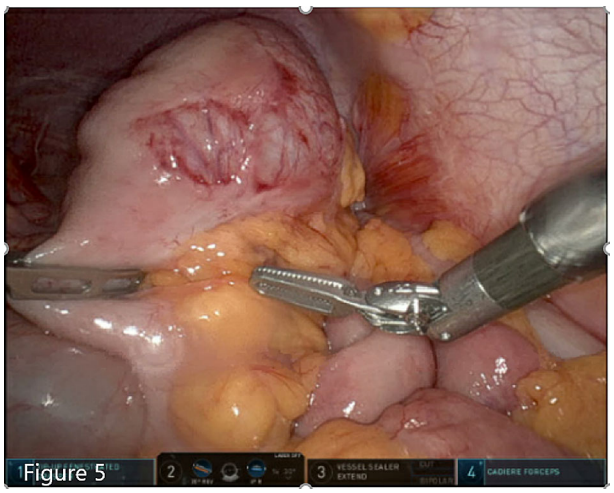
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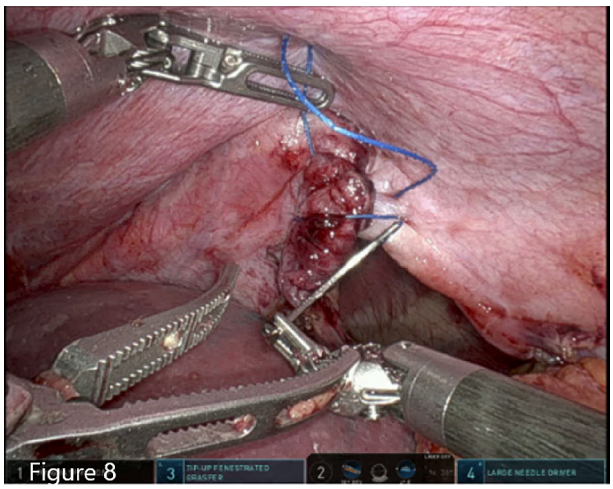
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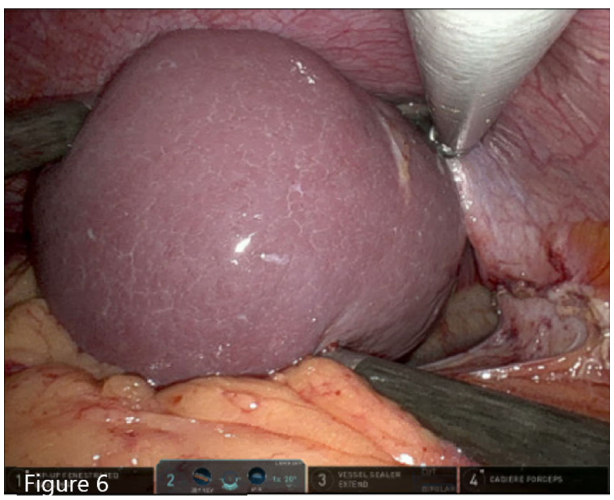
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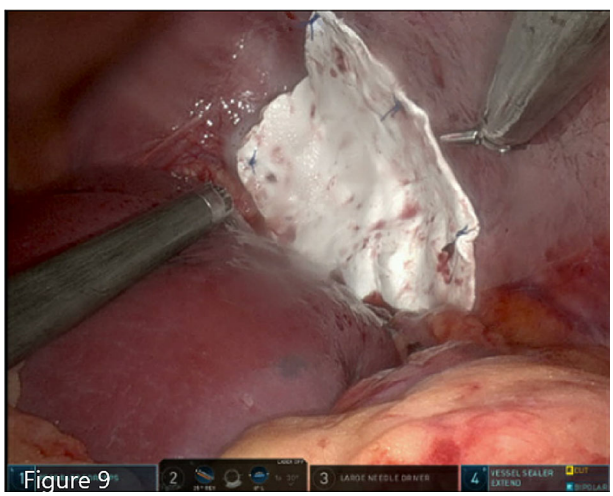


Figure 9

P028

Meckel's Diverticulum Inversion and Intussusception: Laparoscopic Management of a Rare Case of Small Bowel Obstruction in a Teen

Katie Marrero, MD; Kathleen Dominguez, MD; Carle Foundation Hospital

Introduction: Meckel's diverticulum is a congenital anomaly that results from persistence of the omphalomesenteric duct at its attachment site to the distal ileum. The main symptoms associated with Meckel's diverticulum include GI bleed and less commonly intussusception, volvulus and diverticulitis. inversion of a Meckel's diverticulum is rare and has been reported in only a few case series worldwide. The reasons for inversion include abnormal peristalsis around the diverticulum and non-fixity of the diverticulum itself. In many cases of Meckel's inversion necessitating surgical intervention typically require a formal bowel resection often via a laparotomy. This case represents shows the ability to diagnose a Meckel's diverticulum as the lead point of intussusception and was later found to be inverted. Additionally, we were able to operatively reduce the bowel and do a Meckel's diverticulectomy without full bowel resection all in a laparoscopic manner.

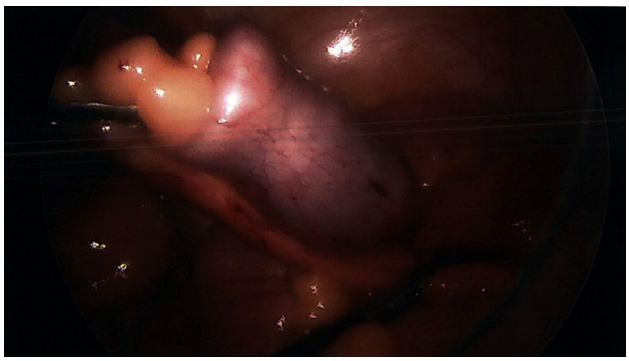
Case Report: An 11-year-old male presented to the ED with a 2 day history of worsening abdominal pain. He endorsed some nausea but no vomiting. His last bowel movement was prior to the onset of his abdominal pain. A CT scan of the abdomen was completed with showed concern for small bowel intussusception with a Meckel's diverticulum as the lead point (image 1). While the patient was hemodynamically stable with normal laboratory values, the length of his continued pain was concerning, and the decision was made to take him to the operating room.

A diagnostic laparoscopy was performed, and the intussusception was identified. On reduction of this, the Meckel's diverticulum was found to be completed inverted with the lead point being the tip of the diverticulum (image 2). The Meckel's diverticulum was resected, and all other bowel appeared to be healthy and viable, thus allowing us to avoid any further bowel resection (images 3).

Given the location of our laparoscopic port sites (standard appendectomy position) and the concern for further misdiagnosis, the decision was made to proceed with an appendectomy as well at this time. Pathology showed a normal appendix and a Meckel's diverticulum line by small intestines and gastric oxyntic mucosal tissue with acute inflammation.

The patient recovered uneventfully and was discharged home without further complication.

Discussion



P030

Colostomy for Sacral Decubitus Ulcers: Laparoscopic vs Open Approach

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Introduction: Diverting colostomy has long been a treatment for severe sacral decubitus ulcers that have failed conservative management with local wound care. This study seeks to see if there are any differences in outcomes when the procedure is performed using a laparoscopic versus open approach.

Methods and Procedures: The ACS-NSQIP database was searched for cases between 2005 and 2019 that had primary diagnosis code for decubitus ulcer and a CPT for colostomy. Patients with age < 18 years, ascites, disseminated cancer, or ASA class 5 were excluded. Those with both laparoscopic and open procedures (n = 3) were also excluded. The Fisher Exact test was used to examine the association of pre-operative variables with procedure type (laparoscopic vs open) as well as the univariable association of procedure type with outcomes, including wound events (surgical site, deep wound, or organ space infection, or dehiscence), renal events (AKI, dialysis), sepsis, MACE (MI, cardiac arrest, stroke), and VTE (PE or DVT). Multivariable logistic regression models were used to adjust for potential pre-operative confounding variables. Covariates were selected using backward elimination when $p > 0.20$. SAS (version 9.4, Cary, NC) was used for data analysis with $p < 0.05$ considered significant.

Results: There were 885 laparoscopic and 622 open cases after exclusions. Patients who received open surgery were more often black, had higher pre-operative incidence of AKI, dialysis, CKD and sepsis, and were more likely to have serum albumin < 3.2 g/dL, HCT < 36, BUN > 23, but they did not differ significantly on sex, other comorbidities, ASA class, or emergency surgery. In univariable analysis, 30-day incidence of wound events ($p = 0.03$) and pulmonary events ($p = 0.011$) were significantly higher in patients who received open surgery and remained significant when adjusting for pe-op variables. Return to OR and UTI were higher in open surgery but not to statistical significance (return to OR $p = 0.051$, UTI $p = 0.07$), and this association decreased when adjusting for pre-operative variables.

Conclusion: After adjusting for confounding pre-operative variables, patients who undergo laparoscopic colostomy surgery for decubitus ulcers have lower rates of wound events and pulmonary events compared to patients who undergo open surgery.

P031

Increased Length of Stay in Small Bowel Obstruction Following Implementation of Emergency General Surgery Model

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Introduction: Small bowel obstructions (SBO) represent one of the most common causes for admission to surgical services, with over 350,000 operations performed in the United States each year for SBO. In fact, 1 in 6 admissions to a surgical service is due to an SBO. While other studies in the literature have looked at management strategies (operative verse non-operative), there is little data on the influence of a dedicated emergency general surgery (EGS) service on hospital length of stay (LOS) for SBO. We sought to evaluate the LOS for SBO patients at a single, academic institution before and after the implementation of an EGS model.

Methods: A longitudinal, observational study was performed to evaluate the influence of the EGS service on the LOS for SBO at a single, academic institution. Using the New York State SPARCS Administrative Database, all adult patients that presented to the emergency department and were admitted for a SBO were included. The LOS 2 years prior and 2 years following the implementation of the EGS service were analyzed and compared to other institutions in our region, including academic and community hospitals. LOS was compared using generalized linear models for a negative binomial distributed outcome, after adjusting for significant risk factors in corresponding univariate regression models. Length of stay is defined as the difference between discharge date and admission date.

Results: 155 patients were admitted for small bowel obstruction at our academic institution during the 4-year study period, with the majority being over 50 years old (70.97%), female (54.84%), on Medicare (38.06%), and white (81.94%). Prior to the implementation of the EGS model, our institution reported shorter LOS when compared with other regional academic hospitals (RR = 1.19, 95% C.I. 1.02, 1.39) and other regional community hospitals (RR = 1.10, 95% C.I. 0.95, 1.28) although not statistically significant for community hospitals. Following the implementation of EGS, our institution saw a longer LOS compared to regional academic hospitals (RR = 0.78, 95% C.I. 0.68, 0.89) and regional community hospitals (RR = 0.84, 95% C.I. 0.73, 0.96).

Conclusion: The implementation of an EGS service at our academic institution is associated with an increased LOS for patients admitted SBOs when compared to other regional academic and community hospitals. This is likely due to an increase in nonoperative management, which likely increases length of stay.

P032

Acute Appendicitis Secondary to Lymphoid Hyperplasia from Parasitic Infestation

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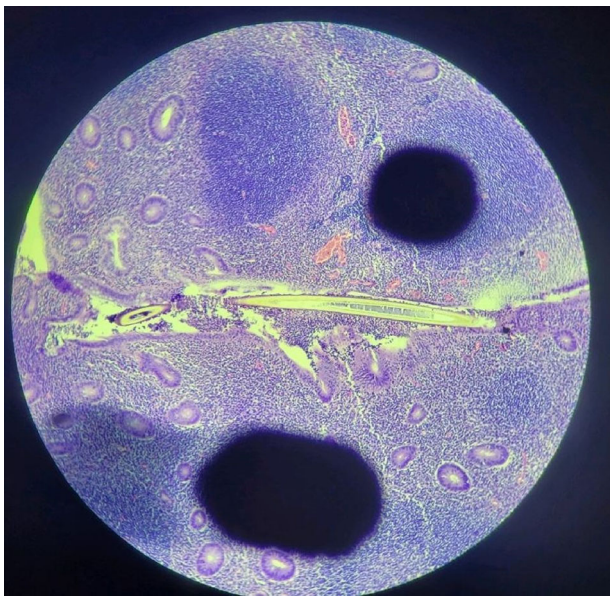
We present an 18 year old male with a medical history significant for obesity (BMI 41), who presented to the Emergency Department with sudden onset right lower quadrant abdominal pain for a day. While in the emergency department, he was afebrile but tachycardic to 101 pulses per min. His workup was significant for a white blood cell count of 11×10^3 /uL and an eosinophil count of 0.05 (nl 0.00–0.70 K/uL). He underwent an abdominal CT scan showing hyperenhancement of the distal appendix and dilation to 1.2 cm consistent with appendicitis without perforation. He was taken to the operating room for laparoscopic appendectomy, which was uncomplicated. He was discharged postoperative day one. His pathology report showed marked lymphoid hyperplasia with the appendix showing a parasitic worm in the lumen along with neutrophil infiltration suggestive of acute appendicitis, with peri-appendicitis and fibrous adhesions.



P034

Strangulation of Small Intestines Causes by Paracecal Hernia due to Congenital Anomaly

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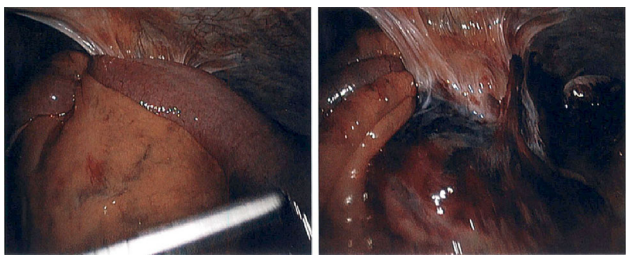
Paracecal hernia is a rare type of internal hernia that can present as a small bowel obstruction. Risk factors that can cause a paracecal hernia may be related to congenital anatomic anomalies, defects in the paracecal area related to surgery or trauma, adhesions, or increased intra-abdominal pressure.

This case is of an 84 year old male who reported to the emergency room with right lower quadrant abdominal pain, nausea, vomiting, and a three-day history of diaphoresis. No significant abdominal surgery was reported besides a recent left open nephrectomy nine months prior. The CT scan showed dilated small bowel loops lateral to a medially displaced cecum. Laparoscopy was performed followed by conversion to open. Proximal ileum appeared to be herniating from inferior to superior along the white line of Toldt adjacent to the cecum, creating an internal hernia defect between the posterior aspect of the cecum and the anterior aspect of the retroperitoneum. Approximately 10 inches of ischemic bowel was reduced from the defect and was resected due to nonviability. The defect was closed. A very redundant right colon and lax white line of Toldt was observed. The internal hernia defect appeared to be created by congenital attachment to pelvic brim, creating internal hernia defect posterior to the cecum and hernia sac that ran posterior and lateral to the cecum through the white line of Toldt. According to Meyer's classification, this could be classified as a lateral paracecal hernia. The patient's post-operative course was uncomplicated. He was discharged on post operative day six.

Although encountered infrequently, paracecal hernia should be considered in a surgeon's differential diagnosis, as there is a high likelihood of bowel ischemia. Differential diagnosis of small bowel obstruction should also include the subtypes of internal hernias such as paracecal. There is evidence that ischemia to the bowel is rapid and aggressive in paracecal hernias. Delay in treatment can lead to increased morbidity; therefore, timely diagnosis is of utmost importance. Once diagnosed, surgery should promptly be performed in order to prevent further complications. CT imaging and surgery can give a definitive diagnosis and appears to be highly accurate. Surgery can be done laparoscopically or open and may be determined based on surgeon's preference. There is evidence that early diagnosis can result in less complicated paracecal hernias and decreased need for an exploratory laparotomy. Laparoscopy for obstruction has been shown to reduce morbidity and decrease postoperative stay.



P035

Risk Factors Associated with Acute Mesenteric Ischemia in a 10-Year Retrospective Study of 10,579 Patients

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Introduction: Acute mesenteric ischemia (AMI) is caused by reduced blood flow to the visceral organs, most commonly due to arterial obstruction. While an uncommon etiology of abdominal pain, AMI is associated with a high rate of morbidity and mortality, with some studies in the literature reporting mortality as high as 80%. It can present as a particularly challenging clinical dilemma since it often requires general and vascular surgery interventions. Given the high rate of mortality of this pathology, and the lack of improvement in the survival rate during the past 70 years, we sought to characterize the patients and risk factors associated with AMI in a large, state-wide retrospective study over a 10-year period.

Methods: A longitudinal, observational study was performed to evaluate risk factors as well as characteristics of AMI. Using the New York State SPARCS Administrative Database, all adult patients who presented to the emergency department and admitted for AMI, identified using ICD codes between the years of 2009–2018, were identified. This group was compared to a control group which consisted of all adults admitted for reasons other than AMI during the same time period. Comorbidities and complications were compared between the two groups.

Results: A total of 10,579 patients were admitted for AMI over 10 years in New York State. This represents an incidence of 0.12% of all hospitalized patients. These patients were more likely to be female (72.3% verse 61.23%) and skewed older, with 50.66% patients being over 70 years old compared to 24.64% in the control group. These patients were also more likely to be white (72.3% verse 53.58%) and on Medicare (53.66% verse 28.46%). AMI patients were more likely to have any comorbidity (90.06% verse 68.72%), including peripheral vascular disease (9.71%), chronic pulmonary disease (16.45%), renal disease (7.66%), hypertension (66.10%), and diabetes (18.44%). AMI patients were also more likely to have any complication compared to other hospitalized patients (34.62% verse 18.72%, respectively), including bacterial disease (6.20%), hemorrhage (3.54%), intestinal issues (7.99%), renal failure (11.39%), respiratory failure (6.87%), shock (3.88%), tracheostomy (0.72%), and prolonged ventilation (2.55%).

Conclusion: AMI is a relatively uncommon diagnosis, representing only approximately 0.1% of all hospital admissions, while disproportional effecting older white females with Medicare. AMI patients are also more likely to have multiple comorbidities compared to the average hospitalized patient, and also to experience more complications in the hospital.

P036

Early Results of Robotic Assisted Perforated Ulcer Repair from a Private Practice Surgeon

Ashlee Justice, MD; Sean Dort, MD; Southern Nevada Surgery Specialists

Introduction: Perforated peptic ulcer disease is a common surgical emergency. The classic treatment is a midline laparotomy however as surgeons become more efficient with minimally invasive techniques, robotic repair is now a viable option. The purpose of this case series is to describe our experience with four patients who successfully recovered after robotic assisted graham patch repair.

Methods: There were 4 patients who underwent robotic perforated ulcer repair from February 2021 to July 2021. The perforations were repaired by primary suture closure followed by application of an omental patch. All cases had a postoperative drain as well as a decompressive nasogastric tube. Each patient underwent an upper GI evaluation prior to initiation of diet. Intravenous antibiotics and therapeutic dosing of Proton Pump inhibitors were given to all patients.

Results: The average operative time was 68.8 min. The average stay was 5.25 days. None of these patients had a postoperative abscess, leakage from repair or surgical site infection.

Discussion: Robotic Assisted oversew is a technical option in selected patients presenting with perforated gastric ulcer. Patients have to be able to tolerate pneumoperitoneum and be hemodynamically stable. One technical concern is the ability to perform copious abdominal lavage, however no patients in this series had a postoperative abscess. Robotic technique seems to be comparable to open repair with the advantages being less incision pain, less hernia risk and improved cosmetic results.

P037

RAI predicts mortality in patients undergoing colectomy for diverticular disease at Veterans Affairs hospitals

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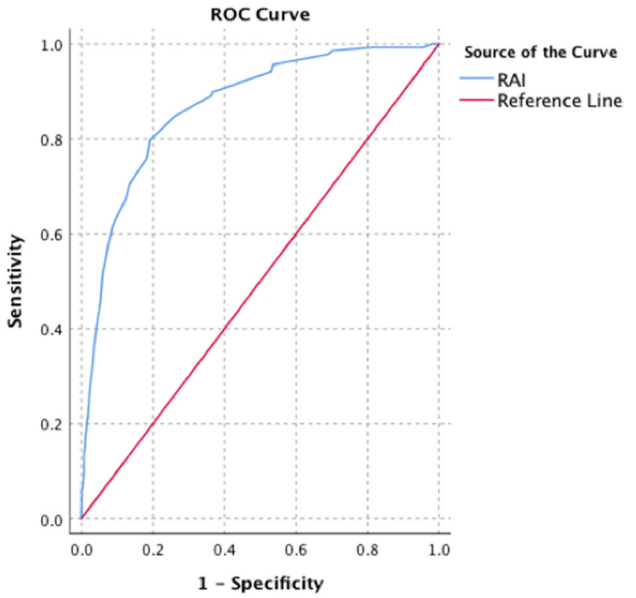
Introduction: Diverticular disease is a common condition that sometimes requires surgical management, including colectomy. These procedures may not be tolerated equally by all patients due to comorbidities and frailty. The Risk Analysis Index (RAI) is an easily administered measure of frailty. We sought to determine if RAI could predict 30-day mortality in veterans undergoing colectomy for diverticular disease by examining the Veterans Affairs Surgical Quality Improvement Program (VASQIP) database.

Methods: After IRB approval, the records for 63,448 colectomies from 1999–2019 were obtained from VASQIP. Of these, 5,517 had post-operative diagnosis codes associated with diverticular disease. Patient characteristics including gender, comorbidities, and surgical outcomes were tabulated. RAI score was calculated for these cases. ROC and C-Statistics were used to evaluate the predictive value of RAI for mortality using SPSS version 26.0.

Results: In this cohort, patients were overwhelmingly male (95.0%). Average age was 59.92 ± 11.41. The majority of cases were done from an open approach (80.9%). Complications occurred in 27.4% of cases, with the most common being superficial surgical site infections (9.7%). One hundred thirty-eight patients (2.5%) died within 30 days of surgery. RAI was a strong predictor of 30-day mortality (C-statistic 0.868, $p < 0.001$).

Conclusion: RAI is a strong predictor of mortality in patients undergoing colectomy for diverticular disease. This information may be useful in counseling patients about their surgical risks preoperatively.



Area	Std. Error	95% Confidence interval Lower bound	95% confidence interval Upper bound
0.868	0.015	0.838	0.898

Figure A CT chest/abdomen/pelvis scout film demonstrating marked dilation of the entire colon with severe stool impaction of pneumastosis coli of the proximal colon.

P038

Acute Colonic Pseudo-obstruction Masquerading as an Acute Aortic Occlusion

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Background: An elderly female, with a history of multiple abdominal operations and polypharmacy, presented emergently with evidence of acute aortic occlusion and abdomincal compartment syndrome secondary to acute colonic pseudo-obstruction.

Summary: Our patient presented in extremis to an outside facility with evidence of acute aortic occlusion (AAO). Upon transfer to our center, clinical findings and imaging later revealed abdominal compartment syndrome secondary to acute colonic pseudo-obstruction (ACPO), better known as Ogilvie Syndrome. This patient had numerous risk factors for ACPO and had been symptomatic for some time prior to presentation, but did not seek medical treatment until late in her clinical course. The patient was taken emergently to the operating room for a subtotal colectomy. Upon decompressing the abdomen, the patient developed distributive shock from reperfusion of the lower extremities and abdominal viscera, which subsequently led to the development of coagulopathy, hypothermia, and acidosis necessitating conversion to a damage control laparotomy. Despite maximal medical therapy, the patient developed multi-system organ failure. The patient was eventually transitioned to comfort care by her family and expired shortly thereafter.

Conclusion: AAO is a rare vascular emergency that requires immediate surgical attention. ACPO as the etiology of AAO has never before been documented in the literature. We present a case that describes our experience with AAO from external compression due to ACPO. Indeed, this circumstance poses as both a therapeutic dilemma for surgeons and intensivists alike as the treatment may exacerbate underlying pathophysiology ultimately leading to the patient's demise. Early presentation, expedient surgical intervention, and aggressive critical care management is vital to the patient's survival.

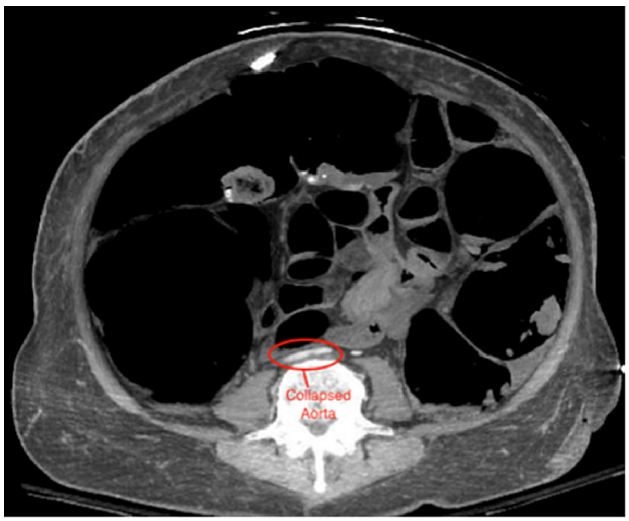

Figure B CT chest/abdomen/pelvis axial view demonstrating severe external compression of the abdominal aorta by the dilated colon.

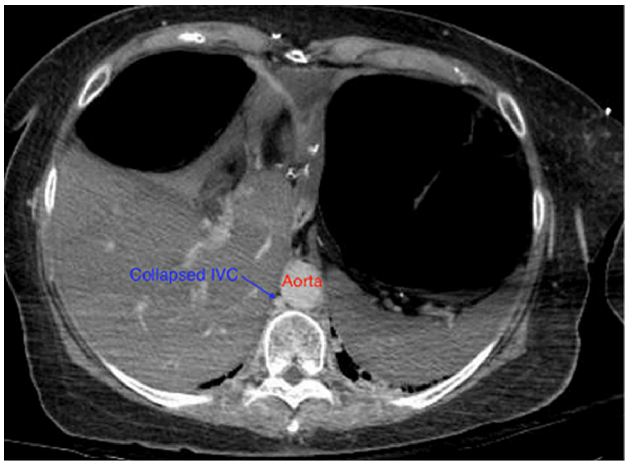

Figure C CT chest/abdomen/pelvis axial view demonstrated collapsed abdominal inferior vena cava.

P039

The Clinical Outcome of Laparoscopic Cholecystectomy Beyond 72 Hours After Onset in Acute Cholecystitis

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Background: Early laparoscopic cholecystectomy (ELC) is the standard treatment of choice in almost all of patients with acute cholecystitis and should be operated within 72 h after the onset. However many patients have to undergo late laparoscopic cholecystectomy (LLC) beyond 72 h according to their conditions and the limitation of operating theater available. There was lack of evidence supporting a safe delayed LC in these circumstances.

Objective: This study aims to compare clinical outcomes of early laparoscopic cholecystectomy (ELC) and late laparoscopic cholecystectomy (LLC) in patients with acute cholecystitis patients.

Method: We retrospectively reviewed patients who has undergone laparoscopic cholecystectomy (LC) during January 2014 to December 2020 at Bhumibhol Adulyadej Hospital. There were 1,319 LCs done during this period and 150 LCs(11.3%) was for acute cholecystitis patients. The primary outcome was the total length of hospital stay and the secondary outcomes were post-operative hospital stay, conversion rate, operative time, blood loss and complications.

Result: We admitted 834 patients with acute cholecystitis and reviewed cases that underwent LC (150 cases;17.9%) at first admission. Those with concomitant CBD stone cholangitis and those who required percutaneous cholecystostomy were excluded. The remaining 124 patients were analyzed with 49 ELC cases and 75 LLC cases. Both groups showed no significant difference in patient's characteristics (Gender, Age, ASA classificationand severity grading base on Tokyo guideline 2019 criteria). The LLC has significantly greater amount of blood loss than ELC 144.3(94.6–193.9) vs 77.7(46.5–108.8) ml, p = 0.025 as well as the total length of hospital stay 9.39(8.05–10.78) vs 6.34(5.17–7.32) day,p = 0.001. However, post-operative hospital stay in both group were not significantly different (5.48(4.35–6.61) vs 5.06(3.98–6.14), p = 0.614). Moreover, there were no significant differences in conversion rate (5.4% vs 4%, p = 0.751), operative time (136 vs 131 min, p = 0.50) and operated relate complication (9.3% vs 8.1%, p = 0.388).

Conclusions: Late laparoscopic cholecystectomy in acute cholecystitis performing beyond 72 h of symptoms onset can be performed safely in which the surgeon is experienced and the selected patient is well suited for surgery.

Keyword: Acute cholecystitis, Early laparoscopic cholecystectomy, Late laparoscopic cholecystectomy.

P040

Isolated Diverticulitis of the Appendix Presenting as Acute Appendicitis

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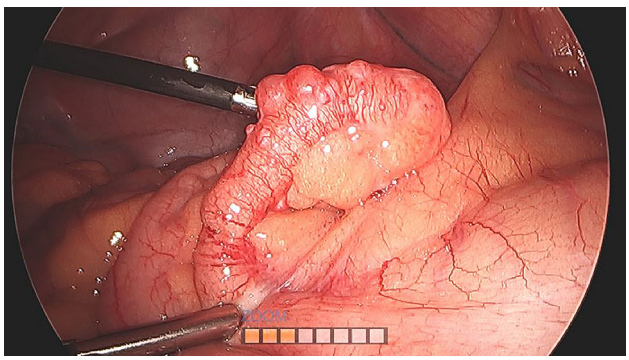
Introduction: Diverticulitis of the appendix is a rare clinical entity and usually presents with atypical abdominal symptoms. It has been associated with a faster progression to perforation and higher rate of mortality. Studies have previously described the frequency of appendiceal diverticulitis as ranging from 0.004% to 2.1%. Studies have also linked appendiceal diverticula to an increased frequency of neoplasms. Appendiceal diverticular disease has five described subtypes. In this case report, we describe the presentation of type 1 appendiceal diverticular disease and a review of the literature.

Case Description: 28 M witno past surgical history or past medical history who presented to the ED complaining of 1 day of abdominal pain that woke him from sleep. The pain was associated with nausea and one episode of non-bilious non-bloody emesis. The pain was described as generalized and not localized to any specific area. The patient's vitals were normal with normal temperature, heart rate, and blood pressure. Labs did not show any leukocytosis. The abdominal exam was soft, non-distended, minimally tender in RLQ and epigastric area with no guarding or rebound. CT abdomen and pelvis with oral and IV contrast revealed a minimally prominent 9 mm appendix tip with surrounding trace fluid and read as representing tip appendicitis in the appropriate clinical setting. The patient was started on IV fluids and IV Unasyn. The decision was made to bring the patient to the OR for a laparoscopic appendectomy that night. Intraoperative findings revealed a non-gangrenous, non-perforated appendix with multiple visible cystic-like outpouchings along the distal end. The appendix was sent to pathology and the final report revealed nodularity near the tip on the serosal surface, a cyst at the tip of the appendix measuring 0.4 cm in greatest diameter, and a final diagnosis of diverticular disease with one of the diverticulum showing acute diverticulitis with acute serositis and adhesions.

Discussion: Diverticulitis of the appendix is a rare clinical pathology that presents a diagnostic challenge but has important clinical implications. It is an entity that surgeons should be aware of in the course of managing patients with atypical or equivocal findings of acute appendicitis.



P041

Trends and Outcomes of Alcoholic Intoxication in Trauma Patients

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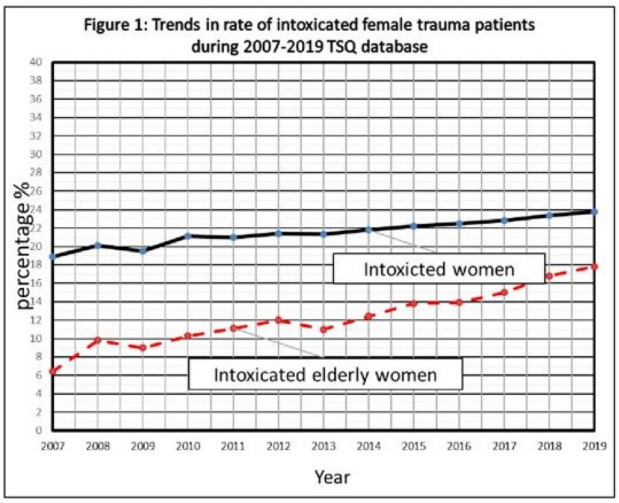

Objective: We sought to investigate the rate and trends of positive alcohol test in different ages and sexes and compare outcomes of patients with and without positive alcohol test.

Methods: Multivariate analysis using logistic regression was used to compare positive alcohol test in women compared to men and investigate trends during 2007–2019 using TQP database.

Results: We found 1,399,366 trauma patients who were brought to emergency room and had a detectable alcohol in blood during 2007–2019 in TQP database. Overall, 8.4% were elderly (older than 64 years). Elderly patients with a positive alcohol test had significantly higher mortality risk (3.2% vs. 1.3%, AOR: 2.47, $P < 0.01$). Although, only 21.7% of patients with detectable alcohol test were women, the rate of women with positive alcohol test increased significantly in elderly (age more than 64) (20.6% vs. 33%, $P < 0.01$).

Overall, 72.7% of patients with detectable alcohol in blood were intoxicated (illegal alcohol level). Among intoxicated patients 7.4% were elderlies and 20.7% were women. The rate of intoxicated women increased from 19.9% to 30.1% for women older than 64 years ($P < 0.01$). During the 13 years of the study period, the rate of positive alcohol test for women increased from 18.9% for 2007 to 23.8% for 2019. The same gradually increasing pattern was observed for the rate of positive alcohol in blood in elderly women in 2007 (6.4%) compared to 2019 (17.8%) (Fig. 1).

Overall, there was a minimal difference in mortality rate of intoxicated men and women (1.6% vs. 1.2%). However, the mortality risk of intoxicated elderly men was significantly higher than intoxicated elderly women (3.6% vs. 1.8%, $P < 0.01$).

Conclusions: Patients with alcohol intoxication have higher mortality risk after trauma. The mortality risk increases with age and is the highest in elderly men. There is a gradual increase in the rate of alcoholic intoxication in women during 2007–2019. The highest rate for alcohol intoxication in women is presented in women older than 64. Further studies are needed to investigate alcohol intoxication in women and the possible preventive strategies for trauma for elderly women.

P043

Appendicular Diverticulitis, is it Appendicitis or Pre-malignant Signs?

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Introduction: First described in 1893 by Kelynack and thought of as rare, appendicular diverticulitis (AD) has in as many as 10% of appendectomy specimens. Appendiceal diverticulitis is acute inflammation of diverticuli in the vermiform appendix and comes in two forms congenital and acquired. The congenital form involves all 3 layers of bowel wall representing a true diverticulum, whereas, the acquired form is a "psuedo-diverticulum" with only mucosa and submucosa involved. It mimics acute appendicitis however, it carries four times the risk of perforation, thirty times the risk of mortality, and is frequently associated with mucinous neoplasms and tumors. The incidence of appendiceal neoplasms is increasing and age at presentation decreasing according to recent literature.

Methods: We present 13 cases of AD encountered in our hospital. Patients presented to our ED with abdominal pain and subsequently had an appendectomy with specimens submitted for pathology review. Chart review was completed each patient for completeness.

Results: The most common presenting symptoms were right lower quadrant abdominal pain (11/13), nausea (5/13), periumbilical abdominal pain (5/13), leukocytosis (4/13). Results characterizing our initial findings are in table 1. Neoplasms found include mucocele, mucinous adenoma, Low-grade-appendiceal-mucinous neoplasm, and goblet cell adenocarcinoma.

Conclusion: While milder in presentation, AD is often missed and can result in perforation or have worse underlying disease. We recommend considering AD in cases of right lower quadrant pain with dilated appendix on imaging, a prompt appendectomy following diagnosis, and reviewing histopathology to rule out possible associated neoplastic malignancies given the higher incidence with AD.

P044

Challenges in Diagnosis and Management of Gonadal Torsion in New York State

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Introduction: Diagnosing gonadal torsion (GoT) is time sensitive because of limited time window to attempt organ-saving treatments rather than resection on one or both sides. Other than anatomical differences in male and female reproductive systems that could majorly contribute to the gender disparities in diagnosing GoT, earlier studies demonstrated significant rates of organ loss, especially for women. The purpose of this study was to examine trends in the management of diagnosed GoT cases in New York State (NYS) from a population based data registry and identify risk factors for organ loss.

Methods and Procedures: Using hospital inpatient, emergency and ambulatory centers data available NYS's Statewide Planning and Research Cooperative System (SPARCS), we identified diagnosed gonadal torsion cases between 2005 and 2019 based on ICD and CPT codes. We conducted bivariate and multivariable analyses to examine gonadal resection and gonadal saving treatments among male and female patients and factors associated with differences in treatment choices. We explored variations in pathways to care from initial presentation to treatment to understand factors responsible for potential delays including hospital size and location and provider specialty.

Results: Across all ages, there were 8381 male and 7664 female encounters treated for GoT. Among males, 2484 (30%) of them underwent testicular resection (TR) whereas 6640 (87%) of females had ovarian resection (OR). The average age of GoT patients was 17.6 years for males and 35.2 years for females. A higher proportion of TR vs. testicular salvage (TS) was observed among males aged < 12 and > 50 years, Blacks, those with Medicaid/Medicare and rural patients (all $p < 0.01$). A higher proportion of ORs vs. ovarian salvage (OS) was observed among females aged > 50 years, Whites, and rural patients (all $p < 0.01$). Similar results were observed among male and female patients aged ≥ 20 years.

Conclusions: Recognizing GoT accurately and within a short period of presentation may be deciding factor between gonad saving and resection treatments, particularly among females across all ages and prepubescent males. Improvement in diagnosis practices in acute presentations and identifying higher risk patients with predisposing conditions might lead to better outcomes.

P045

Morbidity and Mortality Associated with Preoperative Therapeutic Anticoagulation and Revisional Bariatric Surgery

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Background: Revisional bariatric surgery is becoming more prevalent over time, and the complexity of the patients undergoing these procedures is expanding. The outcomes of patients who are on therapeutic anticoagulation prior to revisional bariatric surgery has not yet been investigated. Our study examines the impact of preoperative therapeutic anticoagulation on complications and outcomes of revisional bariatric procedures.

Methods: Between 2015 to 2019, a total of 147,430 patients in the MBSAQIP database underwent a revisional bariatric surgery. Of those, 5,103 patients were on therapeutic anticoagulation pre-operatively. A multivariate analysis was performed to examine the association of preoperative therapeutic anticoagulation with complications such as post-operative pulmonary embolism (PE), post-operative venous thromboembolism (VTE), intra/post-operative transfusion, and unplanned intensive care unit (ICU) admission. Outcomes investigated included length of stay (LOS) greater than 2 days, death within 30 days, reoperation within 30 days, intervention within 30 days, and readmission within 30 days of revisional bariatric surgery. Analyses of complications and outcomes were adjusted for demographics.

Results: Following multivariate analysis adjusting for sex, age, race, pre-operative body mass index, American Society of Anesthesiologist (ASA) classification, and other comorbidities –the use of preoperative therapeutic anticoagulation was associated with LOS greater than 2 days (odds ratio [OR] 1.95, 95% confidence interval [CI] 1.83–2.09; $p < 0.0001$), intra/post-operative death (OR 3.03, 95% CI 2.14–4.27; $p < 0.0001$), reoperation within 30 days (OR 1.85, 95% CI 1.61–2.13; $p < 0.0001$), intervention within 30 days (OR 2.27, 95% CI 2.00–2.59; $p < 0.0001$), and readmission within 30 days (OR 2.01, 95% CI 1.83–2.21; $p < 0.0001$). These patients were also at higher risk of post-operative VTE (OR 2.13, 95%CI 1.40–3.21; $p = 0.0004$), intra/post-operative transfusion (OR 2.66, 95% CI 2.24–3.15; $p < 0.0001$), greater than 2 units of packed red blood cells (pRBC) transfused (OR 2.27, 95% CI 1.66–3.10; $p < 0.0001$), and unplanned ICU admission (OR 2.51, 95% CI 2.14–2.93; $p < 0.0001$).

Conclusion: Patients who are receiving preoperative therapeutic anticoagulation have worse morbidity and mortality when undergoing revisional bariatric surgery. This data provides reason for bariatric surgeons to be aware of the preoperative anticoagulation status of their patients when considering them for a revisional bariatric procedure.

P046

Management of Achalasia After Sleeve Gastrectomy

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Introduction: We present a rare case of achalasia diagnosed many years after laparoscopic sleeve gastrectomy. This patient failed multiple types of conventional treatment and ultimately required a partial gastroesophagectomy with roux-en-y esophagojejunostomy.

Case Presentation: 54 year old female who underwent laparoscopic sleeve gastrectomy at another institution 5 years prior, presented with progressive dysphagia to both solids and liquids. She never had a barium swallow and was only evaluated with endoscopy prior to her initial sleeve gastrectomy. Type 1 achalasia was confirmed with both barium swallow and manometry. Her barium swallow was consistent with achalasia, but it was difficult to evaluate the sleeve in the mid portion of the stomach due to the obstruction of contrast in her esophagus. Patient failed botox injections to the lower esophageal sphincter and laparoscopic heller myotomy. The myotomy opened the gastroesophageal junction but she still could not tolerate sufficient liquids to maintain hydration. Repeat barium swallow revealed a persistently dilated esophagus and a narrowed middle and distal stomach. The patient eventually underwent total gastrectomy and a roux-en-y esophagojejunostomy with resolution of symptoms.

Discussion: There has been only one other reported case of achalasia after sleeve gastrectomy. The incidence of achalasia diagnosed after a sleeve gastrectomy is unknown but will likely increase as bariatric surgery continues to grow. Heller myotomy has been successful in treating achalasia in bariatric patients, but has mainly been described in post roux-en-y gastric bypass patients. This patient's narrow gastric anatomy from prior sleeve gastrectomy failed to allow adequate oral intake even after the gastroesophageal junction was opened after the heller myotomy. The patient's symptoms resolved after undergoing partial gastroesophagectomy with roux-en-y esophagojejunostomy.

Conclusion: This is a rare case that demonstrates the management of achalasia after sleeve gastrectomy. Heller myotomy has been successful in treating achalasia in bariatric patients, but has mainly been described in post roux-en-y gastric bypass patients. Traditional myotomy procedures may not be beneficial in patients with prior sleeve gastrectomy, and these patients may best be treated with immediate conversion to a roux-en-y esophagojejunostomy. Routine barium swallow may allow for early diagnosis of these patients prior to their sleeve gastrectomy.

P047

Analyzing the Efficacy of Laparoscopic Sleeve Gastrectomy and Laparoscopic Roux-en-Y Gastric Bypass Using BODY-Q

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Introduction: This study aimed to compare patient-reported outcomes between laparoscopic sleeve gastrectomy (LSG) and laparoscopic Roux-en-Y gastric bypass (RYGB), chiefly focusing on body image, physical function, physical symptoms, and body satisfaction. The rising popularity of bariatric surgery has prompted the development of legitimized patient-reported outcomes measures, such as the BODY-Q. With a validated tool like the BODY-Q, researchers have been able to draw distinctions between outcomes related to patient eating behaviors following bariatric procedures such as LSG and RYGB. Similarly, this study implements the BODY-Q to survey LSG and RYGB patients with attention to patient-reported psychological and physiological outcomes post-intervention.

Methods: Surveying was performed from April to September of 2021 utilizing the BODY-Q patient reported outcome measure. Independent scales utilized in this study were *Body image, Physical function, Physical symptoms,* and *Satisfaction with body*. All patient submissions were deidentified and securely stored using the QualtricsXM server. Bariatric patients were contacted via e-mail with web links and information on how to complete the BODY-Q survey. From a total of 102 RYGB patients contacted, 29 completed surveys. Of the 233 LSG patients contacted, 70 completed surveys. Averaged scores from individual questions and independent scale raw sums were compared using Mann–Whitney U tests.

Results: Evaluation showed no significant difference between the component sums of each independent scale when comparing the LSG and RYGB population. Regarding the *Body image* scale, RYGB patients reported better outcomes when compared with LSG in four of seven questions. Significant differences in patient-scoring were observed in five out of ten of the *Satisfaction with body* scale questions indicating better reported outcomes in the RYGB cohort. All other answers showed no significant difference between procedure type. Patient BMI by procedure differed significantly with RYGB (34.05 ± 11.53) having lower means than LSG (37.71 ± 8.28).

Conclusion: Findings suggest that there are no significant differences when comparing patient reported outcomes related to body image, physical function, physical symptoms, and satisfaction with body among the LSG and RYGB cohorts. However, individual questions within the *Body image* and *Satisfaction with body* scales exhibited more positive outcomes among the RYGB group, which can be explained by corresponding findings of lower mean BMI when compared to LSG patients.

P048

Characterization of Comorbidities Predictive of Bariatric Surgery

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Introduction: The obesity epidemic continues to rise with only 1% of eligible patients undergoing bariatric surgery annually. Patients enrolled in bariatric centers of excellence participate in extensive multidisciplinary preoperative counselling in order to select appropriate surgical candidates, which can contribute to surgical wait times. Accordingly, we aimed to characterize commonalities between patients who were successful at obtaining bariatric surgery in an effort to better understand the major factors that make one an ideal candidate for surgical management.

Methods and Procedures: A retrospective chart review of all patients enrolled at a single, publically funded bariatric center of excellence in the year of 2015 was performed. Patient demographics, baseline comorbidities, and surgical data were extracted. Patient factors were correlated with surgery using the chi-square test. Binary logistic regression analysis was utilized to develop a statistical model to predict the likelihood of receiving bariatric surgery.

Results: In 2015, 666 new patients were enrolled in the bariatric clinic, with 481 (72%) female. Of this, 208 (31%) patients ultimately underwent bariatric surgery. Chi-square analysis ($p < 0.05$), of the individual evaluated comorbidities revealed that alcohol abuse ($\chi2(1) = 4.34$, OR: 0.00), anxiety ($\chi2(1) = 4.53$, OR: 0.60), gastroesophageal reflex disease ($\chi2(1) = 10.16$, OR: 0.54), hypothyroidism ($\chi2(1) = 5.37$, OR: 1.59), liver disease ($\chi2(1) = 24.15$, OR: 0.20), osteoarthritis ($\chi2(1) = 7.49$, OR: 0.59), mental health comorbidities ($\chi2(1) = 8.95$), and other medical comorbidities (chronic pain, cardiovascular disease, and incontinence) ($\chi2(1) = 13.39$) were the most predictive individual factors for determining eligibility for bariatric surgery. The logistic regression developed successfully explained 25% of the variance in patients treated with bariatric surgery ($\chi2(22) = 121.32$, $p < 0.05$). The model correctly classified 74.4% of the analyzed cases. Female sex (OR: 2.20), hypertension (OR: 1.71) and dyslipidemia (OR: 2.09) were associated with an increased likelihood of bariatric surgery, whereas patients who presented with gastroesophageal reflux disease (OR: 0.62), liver disease (OR: 0.25), osteoarthritis (OR: 0.52), mental health comorbidities (0.39), medical comorbidities (OR: 0.56), and an increasing number of anti-hypertensive medications (OR: 0.62) were less likely to be considered for surgery.

Conclusion: The use of patient metrics may help predict bariatric surgical candidacy and have a role in triaging for obesity management. We hope this tool can assist clinicians in optimizing resource allocation to expedite access to surgery in eligible candidates while facilitating medical weight-loss options for non-surgical candidates.

P049

Early Postoperative Characteristics Predictive of Favorable Weight Loss Outcomes in Bariatric Surgery

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Introduction: Bariatric surgery outcomes mostly rely on sheer weight loss achieved by the patient and resolution of comorbidities, as well as avoidance of postoperative complications. Although the positive long-term benefits of weight loss depend on 5-year or longer follow-up, short-term surrogates of these positive outcomes are desirable. It is thought that early weight loss (6- and 12-month) may predict long-term (5 year and beyond) weight loss after bariatric surgery. On an even shorter time scale, postoperative laboratory evaluation may anticipate both positive and adverse outcomes of surgery. We hypothesized that positive outcomes (ie, weight loss) would be associated with certain postoperative data points which potentially can identify more difficult surgeries, such as a higher degree of postoperative anemia and blood loss.

Methods: Patients undergoing gastric bypass or duodenal switch surgery between July 2018 and January 2021 at a large health care system were captured in a prospective database. Bivariate Pearson's correlation was used to compare continuous variables and univariable logistic regression for categorical outcome variables. Significant variables in univariate screen were included in a multivariable linear regression model. Two-tailed p-value < 0.05 was considered significant.

Results: Of the 104 patients analyzed, 101 had postoperative labs on record. Hemoglobin (Hb) on POD1 was not significantly correlated with major morbidities ($p = 0.127$). However, a higher level of Hb on POD1 was correlated with excess weight loss at a time period of 6 months ($p = 0.013$). There was no association between postoperative hemoglobin and a patient's comorbidities suggesting these patients are not simply healthier. Interestingly, POD1 Hb was not associated with intraoperative blood loss.

Conclusion: POD1 Hb could provide early information about expected weight loss outcomes in a bariatric patient population undergoing anastomotic weight loss surgery. However, this is preliminary evidence of a connection between postoperative laboratory results and surrogates of long-term patient-oriented outcomes in surgery, and longer-term follow-up is needed.

P050

The Durability of Revisional Sleeve Gastrectomy and Roux-en-Y Gastric Bypass after Previous Adjustable Gastric Band

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Background: Patients with adjustable gastric banding (AGB) often require revision, to one-stage or two-stage sleeve gastrectomy (SG) or Roux-en-Y gastric bypass (RYGB).

Objective: Compare the long-term durability of revisional SG and RYGB, in terms of subsequent revision/conversion (RC).

Methods: The New York Statewide Planning and Research Cooperative Systems (SPARCS) dataset was queried from 2006 to 2013 for patients who underwent primary SG and RYGB, one-stage and two-stage conversion from AGB to SG and RYGB. A multivariable Cox proportional hazard model was used to compare the RC risk among these groups.

Results: 13,749 had primary SG, 621 one-stage and 321 two-stage AGB to SG. 31,814 had primary RYGB, 555 one-stage and 248 two-stage AGB to RYGB. The estimated 5-year cumulative RC incidence rate was significantly lower after primary surgery than after prior AGB (one-stage AGB to SG 14.4%, two-stage AGB to SG 11.6%, primary SG 5.2%, one-stage AGB to RYBG 3.4%, two-stage AGB to RYGB 2.9%, primary RYGB 1.1%, p-value < 0.0001). RYGB and SG did not differ significantly in terms of the elevation effect of one and two stage AGB conversion over primary surgeries (RYGB vs SG: one-stage vs primary HR = 0.97, 95% C.I. = [0.58, 1.63], p-value = 0.9153; two-stage vs primary HR = 1.02, 95% C.I. = [0.50, 2.07], p-value = 0.9596).

Conclusion: RC after AGB to SG or RYGB is more frequent compared to primary surgeries with procedures following AGB to SG being more common than AGB to RYGB. However, that difference was proportionally similar to the difference noted for primary SG and RYGB.

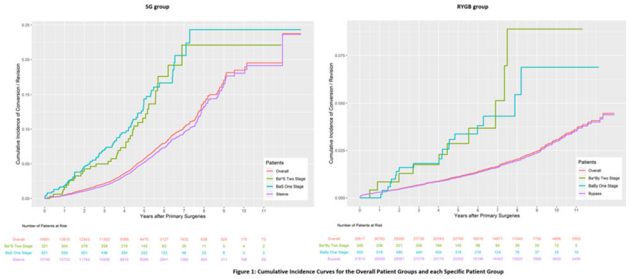

Figure 1: Cumulative Incidence Curves for the Overall Patient Groups and each Specific Patient Group

P051

Enhanced Recovery After Surgery Facilitates Next Day Discharge for Laparoscopic Roux-en-Y Gastric Bypass: A Single Centre Experience

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Introduction: Laparoscopic Roux-en-Y gastric bypass (LRYGB) remains one of the most commonly performed bariatric procedures worldwide. Most patients experience an inpatient stay of two or more days following surgery. More recently however, enhanced recovery after surgery (ERAS) protocols have been implemented to facilitate earlier recovery and discharge after bariatric surgery. In the province of Manitoba, Canada, all bariatric care is provided through the Centre for Metabolic and Bariatric Surgery (CMBS) with most operations taking place at a single community hospital. A short-stay overnight unit with ERAS protocols was introduced in November 2017 with additional protocols to transfer patients with anticipated prolonged stay to a designated tertiary site.

Methods and Procedures: A retrospective review was conducted on prospectively collected data for all LRYGB conducted November 2017- December 2020. Indications for surgery included BMI $\geq$ 35 with obesity related comorbidities or BMI 40 to 55 without comorbidities, age 18–65 and approval by a multidisciplinary bariatric team. Patients were reviewed by the surgeon or designate (Bariatric Surgical Fellow) at 16–21 h postoperatively. Patients were educated regarding signs of potential complication and required to reside within one hour of a tertiary centre in Winnipeg, MB for seven days. This study reports descriptive outcomes of postoperative length of stay (LOS), 30 day emergency room (ER) presentations, 7-day readmissions and 30 day readmissions at the tertiary site.

Results: 439 patients underwent LRYGB from November 2017 to December 2020. The postoperative day (POD) 1 discharge rate was 94.8% and the POD 2 discharge rate was 1.8%. Anticipating prolonged LOS necessitated transfer of 2.7% (n = 12) patients to the dedicated tertiary care hospital. Transfers were related to delayed intraabdominal hemorrhage in 66.7% of cases and the majority required reoperation, while 16.7% of transfers were precautionary due to technically challenging procedures. There were two brief ICU admissions and no mortalities. The 30d ER presentation rate was 10.3% (n = 45), the 7d readmission rate was 2.7% (n = 12) and the 30d readmission rate was 4.1% (n = 18). The most common indication for readmission was gastrointestinal intolerance.

Conclusion: An established ERAS protocol for LRYGB allowed 94.8% of patients to be safely discharged home the next day. The ER presentation, 7d and 30d readmission rates were comparable to existing literature suggesting that next day discharge is feasible for appropriately selected bariatric patients.

P052

Phlegmonous Gastritis as an Incidental Finding in Sleeve Gastrectomy in an Immunosuppressed Patient

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Main: Phlegmonous gastritis is a rare and fatal condition that affects the layers of the stomach. It can be localized or diffused, and there are multiple causes, primary, secondary or idiopathic. Stomach hypoacidity, injury to the stomach lining, surgery, immunosuppression, diabetes and alcoholism, among others, have been described as risk factors. This is a case of an HIV-positive patient with a controlled disease in the gastric sleeve protocol, who during surgery shows a thickening of the stomach, with a pathological finding of phlegmonous gastritis with a Helicobacter pylori infection.

Objective: To describe a case of PG secundary a H pylori infection incidental finding in a sleeve gastrectomy.

Methods and Results: A 43-year-old patient BMI of 38.8 with metabolic disease NASH, hyperlipidemia, sleep apnea with CPAP, knee arthritis with osteosynthesis in the left femur, HIV diagnosed in 2006 debuted with Kaposi's sarcoma with antiretroviral therapy with undetectable viral load who authorized bariatric surgery, laparoscopic sleeve gastrectomy is proposed. previus endoscopy show chronic gastrtitis no H pylori infection. during the procedure we observed the thickening of the entire stomach is striking, which makes one suspect gastric lymphoma. In addition, there is difficulty in passing the 38 F buggie into the pylorus. Intraoperative endoscopy is requested but is not available in the clinic.

We suspected gastric lymphoma associated with HIV, quick processing of the pathology is requested. The specimen is opened in surgery and thickening of the intragastric folds is observed throughout the specimen.

The patient evolves satisfactorily; clear oral fluids are started after 6 h, the next day, he is discharged with a very good postoperative evolution with antithrombotic treatment, oral antibiotic and analgesic. pathologic description MICROSCOPIC DESCRIPTION: Alteration of the typical morphology is recognized by prominent inflammation of the lamina propria with plasma cells and lymphocytes as well as eosinophils and neutrophils with abscess formation; Areas of erosion, ulceration, lymphoid follicles of various sizes, multiple foci of complete intestinal metaplasia, and abundant Helicobacter pylori are identified.

Conclusion: PG is a rare disease, Mainly related to streptococcal infection and of sudden appearance such as an acute abdomen, in this case it is an incidental finding with a satisfactory evolution without previous evidence of infection by h pylori or trauma to the stomach, management with broad-spectrum antibiotics should be started quickly and de-staged according to the antibiogram report. Antibiotic management is effective in 88% of cases, and 12% mortality rate has been reported.

P053

Should we be Including Renal Ultrasounds in Pre-Op Assessments for Bariatric Surgery? Incidental Findings of Renal Cell Carcinoma in Bariatric Surgery Patients

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Introduction: Patients who are potential candidates for bariatric surgery undergo extensive pre-operative assessment and preparation including psychological evaluation, nutritional evaluation, weight loss planning, medical clearance, and preoperative imaging. When obtaining pre-operative imaging, the standard of care is to complete an abdominal ultrasound. However, this may not always satisfactorily reveal pathology within the retroperitoneum, such as renal masses. Patients who have an increased body mass index have been associated with higher incidences of renal cell carcinoma.

Case Description: Herein we discuss two cases of bariatric surgery patients diagnosed with renal cell carcinoma. The first patient was a 42-year-old Caucasian male with a body mass index of 45.0 kg/m^2 who underwent a laparoscopic Roux-en-Y gastric bypass. Upon pre-operative preparation, there were no abnormal findings on abdominal ultrasound. One month post-operatively, he began to complain of left upper quadrant pain. Computed tomography was performed and revealed a $5.8 \times 5.9 \times 6.2$ cm left renal mass. He subsequently underwent robotic hand-assisted left radical nephrectomy with retroperitoneal lymph node dissection and pathology revealed clear cell renal carcinoma. The second patient was a 46-year-old Caucasian male with a body mass index of 55.4 kg/m^2 who was undergoing pre-operative assessment for Roux-en-Y gastric bypass when abdominal ultrasound revealed a complex $8.3 \times 5.1 \times 7.2$ cm right renal mass. He underwent a robotic right radical nephrectomy and pathology revealed clear cell renal carcinoma.

Discussion: The standard of care for pre-operative assessment and preparation for bariatric surgery patients does not include routine dedicated renal ultrasounds. Rather, patients generally only obtain an abdominal ultrasound. Given the increased risk of development of renal cell carcinoma within the bariatric population, consideration should be made to incorporate dedicated renal ultrasounds in patient's pre-operative assessments if computed tomography of the abdomen is not performed.

P054

Impact of Total Small Bowel Length on Weight Loss After Bariatric Surgery

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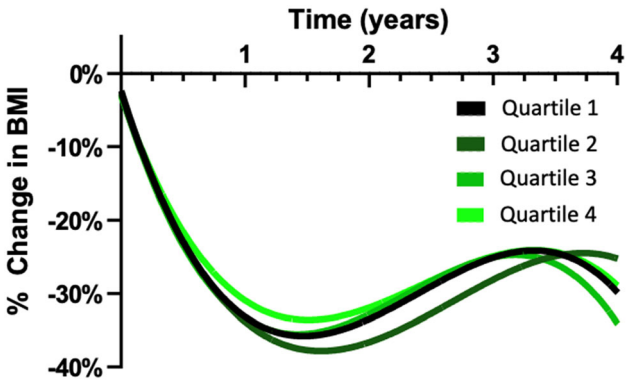
Background: Studies have shown that there is great variability in total small bowel length, ranging from 250 to 1300 cm. It can be postulated that in bariatric surgeries which exert their efficacy through bypass of small intestine, bowel length may have significant impact on patient outcomes. While there are multiple studies that suggest different optimal length of limbs in intestinal bypass bariatric procedures, the impact of total bowel length on post-operative outcomes remain unclear. The aim of this study is to assess the relationship between total small bowel length and postoperative weight loss in patients who underwent either Roux-en-Y gastric bypass (RYGB) or vertical sleeve gastrectomy (SG).

Methods: We prospectively enrolled patients undergoing either RYGB or SG at an academic center from September 2016 to March 2021. For patients who underwent RYGB, a 50 cm biliopancreatic limb with a 125–150 cm alimentary limb were created. Small bowel length was measured during the operation and recorded into our institution's secure longitudinal data analysis tool. The patients' clinical outcomes were followed. Bowel lengths were divided into quartiles for data analysis. Statistical analysis was performed using GraphPad Prism 9.

Results: 269 patients' small bowel length was measured. 71 patients underwent SG, 198 RYGB.

The overall range of total small bowel length was 390–930 cm (median = 580 cm). The range of total small bowel length was 390–910 cm (median = 580 cm) in patients that underwent RYGB, 410–930 cm (median = 590 cm) in patients that underwent SG.

Mean follow-up was 17 months (range 3–54 months). Among patients that underwent RYGB or SG, there was no significant difference in weight loss when comparing differences in total bowel length.



Conclusion: Total small bowel length does not impact weight-loss outcomes in patients who have undergone SG or RYGB. Additional studies are needed to determine differences in postoperative vitamin and mineral deficiencies based on differences in common channel length.

P055

Should Diverticulitis be Considered a Qualifying Weight Related Comorbidity for Bariatric Surgery?

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Introduction: It is well established that diverticular disease and its associated morbidity are linked to obesity. However, diverticular disease is not considered a qualifying "weight related comorbidity" for bariatric surgery. The purpose of this study is to determine the role of obesity in elective laparoscopic colectomy for colonic diverticulitis.

Methods and Procedures: The American College of Surgeons National Surgical Quality Improvement Program (ACS-NSQIP) and colectomy targeted procedure databases were queried from 2012–2019. Patients undergoing an elective, minimally invasive partial colectomy for an indication of diverticulitis were compared based on BMI less than 30 versus patients between 35–40. Patients were excluded if they had a concomitant weight related comorbidity identified through ACS-NSQIP. A 3:1 propensity scored nearest neighbor match was performed along with a post-matching balance assessment to ensure optimal balance. After matching, univariate analysis was performed to examine differences in postoperative outcomes.

Results: 2,217 patients met inclusion criteria including 1,954 non-obese patients and 263 patients with a BMI 35–40. The groups' average BMIs were 25.3 ± 3 and 37.1 ± 1.5, respectively. There were no significant differences between the two groups after propensity score matching (783 patients with BMI less than 30 vs 263 patients with BMI 35–40). After matching, patients with a BMI 35–40 had significantly higher rates of unplanned conversion to open (11.49% vs 7.02%, p = 0.022), operative time (178 vs 163 min, p = 0.005), and readmission (7.28% vs 3.83%, p = 0.023). There was no difference in surgical site infections. While increased in the BMI 35–40 group, the anastomotic leak rate was not significant (4.98% vs 2.68%, p = 0.07).

Conclusions: Patients with obesity who undergo elective laparoscopic colectomies for diverticulitis are associated with increased rates of conversion to open, operative time, and readmission. National societies should consider diverticulitis as a qualifying weight related comorbidity for bariatric surgery for patients with a BMI 35–40.

P056

Long Term Weight Loss After Laparoscopic Sleeve Gastrectomy correlates with the Volume of the Resected Specimen and not with the Volume of the Gastric Sleeve

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Introduction: Effectiveness of laparoscopic sleeve gastrectomy (LSG) in causing weight loss is largely determined by pre- and post-operative stomach volume. Our pilot study published previously (SurgEndosc 2015;29(10):2921–7) showed that the early post-operative weight loss correlated with the volume of excised stomach and not with the volume of the gastric sleeve. The present study reports on the same cohort and aims to find out the long term correlation of weight loss after LSG with the gastric sleeve volume.

Methods: Twenty patients with BMI ≥ 40 kg/m2 and medical comorbidities who underwent LSG between 2011 and 2013 at our institution were reanalyzed prospectively at a minimum follow up of 80 months post LSG. Out of an initial cohort of 20, 10 patients (50%) were lost to follow up over this period. An MDCT of upper abdomen was performed for the remaining 10 patients to calculate the volume of gastric sleeve using the same protocol as initially, at a follow up ranging from 80 – 102 months (average 89.5 months). The overall weight loss and the sleeve volume were assessed at this time point and the results are presented.

Results: The mean pre-operative weight, BMI and stomach volume of these patients were 134.20 ± 25.32 kg, 47.62 ± 5.70 kg/m2 and 1216.30 ± 230.01 ml respectively. The mean volume of the resected specimen and the gastric sleeve were 965 ± 268.54 ml and 251.30 ± 186.03 ml respectively. The mean weight loss, % excess weight loss (%EWL) and the gastric sleeve volume at 3 months post LSG were 20.65 ± 8.01 kg, 34.64 ± 4.86% and 210.10 ± 62.33 ml respectively. The mean weight loss, % excess weight loss (%EWL) and the gastric sleeve volume at long term follow up (average 89.5 months post LSG) were 34.21 ± 12.44 kg, 56.46 ± 4.90% and 330.90 ± 56.42 ml respectively. Thus it was seen that though the volume of the gastric sleeve increased between 3 months and months post LSG, this did not translate into a decrease in %EWL. At both the timepoints of observations, post-operative weight loss correlated with the volume of the excised specimen (r = 0451, p = 0.190 @ 3 months; r = 0.826, p < 0.01 @ 89.5 months) and not with that of the gastric sleeve.

Conclusion: The present study extrapolates the results of our pilot study to show that contrary to the popular belief, postoperative weight loss after LSG correlates well with the volume of the resected specimen and not with that of gastric sleeve, both in the short term (3 months) as well as in the long term (average 89.5 months).

P057

Predictors of Postoperative Pulmonary Complications in Patients Undergoing Bariatric Surgery: An MBSAQIP Analysis

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Background: Postoperative pulmonary complications (PPC) after laparoscopic abdominal surgery are associated with increased length of stay and increased morbidity. We aim to determine what conditions could predict PPC in patients undergoing bariatric surgery.

Methods: We performed a retrospective analysis of the MBSAQIP data registry for patients older than18 years of age and undergoing primary laparoscopic sleeve gastrectomy (LSG) or laparoscopic Roux En Y gastric bypass (LRYGB) between 2015 and 2019. Data on demographics, comorbidities and type of procedure were collected. The primary outcome of the study was the incidence of any PPC, defined as a composite variable including postoperative pneumonia, need for mechanical ventilation ? 48 h, and unplanned endotracheal intubation. A univariate analysis was performed to look for any differences between patients with and without PPC, and a multivariate logistic regression model was performed to determine any significant clinical predictors.

Results: A total of 752,722 patients were included in our analysis (LSG = 73.2%, LRYGB = 26.8%). The mean age was 44.46 ± 11.96 years, with female predominance (79.6%). PPC occurred in 2,390 patients (0.3%). Multivariable logistic regression analysis revealed that the most significant independent predictors of PPC where the preoperative presence of kidney failure (OR = 2.123, CI = 1.599—2.819), renal replacement therapy (OR = 2.032, CI = 1.321—3.127) oxygen dependency (OR = 1.750, CI = 1.344—2.277), and chronic obstructive pulmonary disease (OR = 1.737, CI = 1.410—2.139) (Tables 1, 2).

Conclusion: In our study, the analysis showed that kidney failure, renal replacement therapy, oxygen dependency and chronic obstructive pulmonary disease were independent predictors of PPC after primary bariatric surgery. Prospective studies are needed to confirm these results.

P058

A Case Study of Minimally Invasive Robot-Assisted Esophagectomy for Distal Esophageal Adenocarcinoma in Two Patients with History of Gastric Bypass

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Bariatric surgery is a ubiquitously performed surgical procedure in the United States and worldwide. With the successful long-term outcomes of this procedure, increased observations of esophageal cancer have been described in this patient population. With an estimated 3.2 million surgeries performed between 1998 and 2018, there were over 3000 esophageal cancers diagnosed within this population during that time period. Curative management of esophageal cancer in bariatric patients presents an additional technical hurdle. In Plat et al.'s examination of the epidemiology of esophageal cancer in bariatric surgery patients, the authors found the majority of the cohort's esophageal cancer was in patients who had received gastric bypass and developed distal esophageal adenocarcinoma. Here we present two such patients, a 60 year old female and 75 year old male, who both presented with progressive dysphagia and on workup found to have operable distal esophageal adenocarcinoma 4 and 9 years after their bariatric surgeries, respectively. Both patients had a history of roux-en-y gastric bypass. Both patients received neoadjuvant chemoradiation per NCCN recommendation based on staging criteria. Surgery involved utilizing a team surgical approach in which the bariatric surgical team employed a minimally invasive, robot-assisted approach to mobilize the remnant stomach and reverse the jejunal bypass. The thoracic surgery team then performed a minimally-invasive, robot-assisted Ivor-Lewis esophagectomy. Both patients tolerated the surgery well and advanced along the post-esophagectomy recovery pathway appropriately, excepting a brief postoperative ileus in one patient, and discharged home in good condition on post-op days 7 and 9, respectively. Insights from these patients include the importance of experienced bariatric surgeon involvement as post-radiation treatment changes increase the difficulty of the roux-en-y reversal and mobilization of the gastric remnant. Also, both bariatric and thoracic surgical teams involved in these two cases are high volume centers for revision bariatric surgery and esophagectomy. Surgical management of esophageal cancer in a patient with a history of bariatric surgery is fundamentally a bariatric revisional surgery in the setting of an irradiated field in addition to an esophagectomy. Given our experience with these two patients, these authors would highly recommend post-bariatric esophageal cancer patients be treated at centers that are high volume for both esophagectomy and revisional bariatric surgery.

P059

Food Insecurity does not Increase Peri-Operative Complications After Bariatric Surgery

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Introduction: This study sought to determine the impact of food insecurity on 30-day complications in patients undergoing bariatric surgery at an academic medical center. Food insecurity, defined by the United States Department of Agriculture as a household-level economic and social condition of limited or uncertain access to adequate food, is associated with obesity. For patients with severe obesity, bariatric surgery is the most successful long-term treatment for weight loss. Given the extensive dietary recommendations of bariatric surgery, it is important to consider the impact of food insecurity on bariatric surgery outcomes.

Methods: To determine food insecurity status, primary bariatric surgery patients, including minimally invasive Roux-en-Y gastric bypass and sleeve gastrectomy, having undergone surgery between 7/2020–5/2021 were screened via telephone using three questions from the Epic electronic medical record social determinants of health screen. This data was matched to pre- and post-operative patient data from the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database.

Results: In total, 106 (59%) of the 179 total post-operative bariatric patients responded to screening for food insecurity. Of the 106 screened, 40 patients (38%) screened positive for food insecurity. Evaluation of pre-operative variables between food insecure and food secure patients showed comparable age, BMI, and race, but the groups showed a difference in insurance status at the time of surgery (Food insecure: 17 (42.5%); Food secure: 13 (19.7%), $p = 0.03$). Comparison of food insecurity status with MBSAQIP reported complications did not show a significant correlation between food insecurity and 30-day post-operative complications including ED/urgent care visits and hospital readmissions. Food insecure patients had six (15.0%) ED/urgent care visits and five (12.5%) readmissions, while food secure patients had 10 (15.2%) ED/Urgent care visits and 8 (12.1%) readmissions ($p = 0.98$). There was no difference in length of stay between food insecure (53.2 ± 22.7 h) and food secure patients (47.2 ± 14.9 h, $p = 0.10$).

Conclusion: Food insecurity was highly prevalent, at nearly 40% of the bariatric surgical population at our institution. As food insecurity did not increase the risk of 30-day complications in bariatric surgery patients compared to patients without food insecurity, patients should not be withheld from needed bariatric surgical care due to concerns regarding peri-operative safety based on food access. Future studies are needed to determine the mid- and long-term effects of food insecurity status on weight loss, co-morbidity resolution, and nutritional deficiencies.

P061

Outcomes After Bariatric Surgery in Patients with Pulmonary Comorbidities and Risk Factors

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Introduction: Obesity is associated with altered respiratory mechanics and pulmonary dysfunction. This study aims to evaluate the effects of pulmonary comorbidities/risk factors on postoperative outcomes in patients undergoing laparoscopic Roux-en-Y gastric bypass (LRYGB) and sleeve gastrectomy (LSG).

Methods: The 2015–2018 MBSAQIP database was analyzed. Multivariable logistic regression analyses were performed controlling for preoperative characteristics including age, body mass index, American Society of Anesthesiologist status, and surgery type to determine the risks of complications.

Results: Between 2015–2018, 96,870 underwent LRYGB or LSG. Preoperatively, 41% of patients had obstructive sleep apnea (OSA), 1.8% of patients had chronic obstructive pulmonary disease (COPD), 8.4% of patients had history of smoking, and 0.9% of patients were oxygen dependent.

Patients with COPD were at increased risk of requiring ventilation for > 48 h (Odds ratio [OR] 2.46, 95% CI 1.24–4.87) and pneumonia (OR 2.51, 95% CI 1.47–4.28) than those without COPD. Patients with recent history of smoking were at increased risk of pneumonia (OR 1.64, 95% CI 1.11–2.43). Patients with OSA or oxygen dependence were not at increased risk of pneumonia or prolonged ventilation.

With regards to non-pulmonary outcomes, patients with OSA were at increased risk of any complication (OR 1.19, 95% CI 1.10–1.29), and anastomotic leak was more likely in patients who recently smoked (OR 1.61, 95% CI 1.21–2.14) or were oxygen-dependent (OR 3.12, 95% CI 1.77–5.48). Admission to the intensive care unit (ICU) was more likely for patients with OSA (OR 1.27, 95% CI 1.10–1.46), COPD (OR 1.61, 95% CI 1.20–2.15), recent smoking history (OR 1.29, 95% CI 1.03–1.60), and oxygen dependence (OR 2.25, 95% CI 1.62–3.12). Within 30 days post-surgery, readmission was more likely in patients with COPD (OR 1.59, 95% CI 1.32–1.91) and oxygen dependence (OR 1.61, 95% CI 1.27–2.03), while reoperation was more likely in oxygen-dependent patients (OR 1.90, 95% CI 1.29–2.78). Mortality was only increased in oxygen-dependent patients (OR 2.77, 95% CI 1.17-6.56).

Conclusions: OSA and recent history of smoking were the most frequent pulmonary comorbidities/risk factors in patients undergoing LRYGB or LSG. Although COPD and oxygen dependence were less common, these comorbidities were associated with more significant adverse outcomes. Patients with COPD were at greatest risk of pulmonary complications, while those with oxygen dependence were at greatest risk of non-pulmonary complications such as anastomotic leak and mortality. Thorough preoperative evaluation and optimization of these pulmonary comorbidities are essential given the increased risk and magnitude of postoperative complications.

P063

Totally Robotic Sleeve Gastrectomy Versus Robotic Gastrectomy with Laparoscopic Stapling- Is There A Difference?

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Introduction: Use of the robotic stapler can obviate the need for a skilled bedside assistant. However, the impact of robotic stapling on patient outcomes is not well studied. We sought to determine whether the use of the robotic stapling device impacted the 30-day postoperative outcomes in our bariatric surgery patients.

Methods: A local database of bariatric surgery procedures was used to extract basic demographics for patients undergoing robotic-assisted sleeve gastrectomy over 10 years. A similar operative technique was used for all patients. Patients were split into cohorts based on whether a laparoscopic (Medtronic Endo GIA™) or robotic stapler (SureForm DaVinci Xi®) with bioabsorbable staple line reinforcement (GORE®SEAMGUARD®) was used. Thirty-day outcomes included mortality, wound infection, respiratory or urinary-related complications, cardiac events, metabolic disturbances, readmission, re-operation, leaks, VTE, and bleeding. Descriptive comparisons and Chi-square analyses were made using SPSS.

Results: A total of 301 patients underwent robotic-assisted sleeve gastrectomy by two surgeons in our institution. The robotic stapler was used in 64 cases (21.3%). Overall, there were no mortalities, re-operations, or leaks. The laparoscopic stapling group trended toward more complications but none were statistically significant (Table 1). However, there were 2 postoperative bleeding events in the robotic stapling group (p = 0.042).

Conclusion: Use of a robotic stapler in robotic-assisted sleeve gastrectomy does not appear to be associated with worse outcomes when compared to a laparoscopic stapler. Therefore, the choice of stapler should be dependent on a combination of availability of staplers, cost, skilled first assistant, and surgeon comfort. Further studies with larger sample size are necessary to examine other variables that can determine the clinical benefits of robotic technology in bariatric surgery.

Table 1 Laparoscopic vs Robotic Stapling- 30-day outcomes

Complication Type	Laparoscopic Stapler n = 237	Robotic Stapler n = 64	p-value
Wound Infection	2 (0.8%)	1 (1.6%)	0.515
Respiratory	0	1 (1.6%)	0.213
Renal	6 (2.5%)	0	0.348
Cardiac	0	1 (1.6%)	0.213
VTE	2 (0.8%)	0	1.00
Bleeding	0	2 (3.2%)	0.042
Medical/Metabolic	19 (8.0%)	8 (12.5%)	0.322
30-day Postoperative Readmission	5 (2.1%)	0	0.588

P065

Bariatric Revisional Surgery for Gastro-Gastric Fistula Following Roux-en-Y Gastric Bypass Positively Impacts Weight Loss

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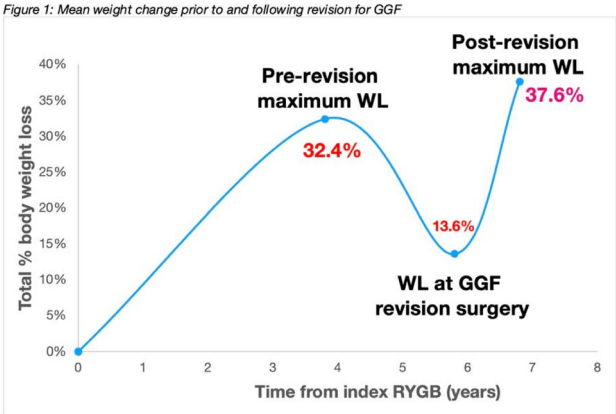
Introduction: Gastro-gastric fistula (GGF) is a rare complication from Roux-en-Y gastric bypass (RYGB), reported to occur in approximately 1–6% of patients. It is a known risk factor associated with weight recidivism and an indication for Bariatric Revisional Surgery (BRS). The primary outcome of this study is to evaluate perioperative outcomes associated with BRS for GGF and the long-term weight loss (WL) outcomes following revision.

Methods: The Obesity Institute Bariatric Registry was utilized to select patients who had primary Bariatric Surgery and BRS from 2003 to 2020 at a Single Academic Institution. A retrospective manual chart review was performed and all patients with GGF who underwent BRS were included. Patients' demographics, perioperative outcomes, and WL were analyzed. Weight loss analysis was limited to the patients who had revision for GGF at least 2 years following the primary RYGB.

Results: One hundred and five patients underwent BRS for GGF after mean 5.8 ± 3.3 years from index operation. Mean BMI at index operation and revision was 51.6 ± 10.1, and 42.4 ± 11.2 respectively. Ninety percent of patients had open primary RYGB, and 69% had open revisional surgery. Eighty-seven percent of patients were female. The median length of stay (LOS) after BRS was 3 days (interquartile range = [2, 5], range = [< 1, 27]). The 30-day reoperation rate was 19%. The 30-day readmission rate was 34%. Of the 105 patients, 93 met criteria for weight loss analysis. Of those, 16 were excluded due to insufficient weight data prior to the revision. Of the 77 patients included for weight loss analysis, the mean %WL after primary Roux-en-Y Gastric Bypass was 34% ± 14. The total mean %WL at the time of revision was 18.8%, translating into a weight regain of 13.6% ± 9.5. The total mean %WL after revision was 37.6% ± 11.4, translating into WL of 18.8% ± 9.4 after revision when compared to WL at revision time. In the years leading up to revision for GGF, we observed weight regain from maximum WL from primary surgery. Following revision, the average WL exceeded the amount regained prior to revision.

Conclusion: Our results demonstrate that revision for gastro-gastric fistula can be safely performed, however is associated with higher morbidity than primary bariatric surgery. Revision for gastro-gastric fistula results in significant long-term weight loss.

Figure 1: Mean weight change prior to and following revision for GGF



P067

Outcomes of Endoscopic Sleeve Gastroplasty in Elderly Population

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Introduction: With the aging of the population and the epidemic spread of obesity, the frequency of elder individuals with obesity is steadily growing. Some recent studies showed promising results of bariatric surgery performed in accurately selected elder subjects who fail non-invasive measures. To date, no data evaluating the use of endoscopic sleeve gastroplasty (ESG) in the elderly have been published. In this case series, we evaluate the technical aspects and short and medium-term outcomes of ESG in patients with obesity aged 65 years and older.

Methods and Procedures: A retrospective analysis was done on a prospective database reporting patients that underwent ESG between November 2017 and April 2021; patients aged 65 years and older were included in our analysis. %EWL, %TBWL, the Bariatric Analysis and Reporting Outcome System (BAROS) questionnaire and the presence of comorbidities were recorded during follow-up.

Results: ESG was perfomed in 263 patients between November 2017 and April 2021.Of these 16 were 65 of age and older. The average age was 67.6 years (range 65–75 years) and the mean baseline BMI was 41.1 kg/m2 (range 32.1–50.2 kg/m2). After ESG the %TBWL was 15.5% ± 4.0 at 6 months, 16.8% ± 7.9 at 12 months, and 18.1% ± 5.3 at 24 months while %EWL was 41.7% ± 14.0, 41.3% ± 17.7, 44.3% ± 15.2 at 6, 12 and 24 months, respectively. The BAROS questionnaire showed an improvement in quality of life with mean scores of 3.5 ± 1.4 at 6 months, 3.3 ± 1.4 at 12 months, and 3.9 ± 1.2 at 2 years. Five of the nine patients with arterial hypertension and two of the three diabetic patients reduced or removed their medications within 12 months following ESG. Two of the five patients with OSA were able to discontinue therapy with CPAP. No adverse events were recorded, and all patients were discharged within 48 h from admission.

Conclusions: According to our experience, ESG is a promising therapeutic option for elder individuals with obesity that are unable to lose weight with non-invasive methods, and who refuse or are deemed not suitable for bariatric surgery because of elevated age and comorbidities.

P068

Cardiac Recovery After Sleeve Gastrectomy: LVAD Explantation Rather Than Transplantation

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Heart failure demands substantial health care resources. Many patients with advanced heart failure require cardiac transplantation. A significant number of these patients undergo left ventricular assist device (LVAD) placement as a bridge to transplantation. Unfortunately, many patients are ineligible for transplant due to an elevated body mass index (BMI). We and others have advocated for sleeve gastrectomy as an avenue for weight loss to achieve a BMI which would allow a patient to be listed for transplant. Here, we present the case of a patient whose heart function improved enough after sleeve gastrectomy to have his LVAD removed.

Patient is a 35-year-old male with a history of obesity who presented to the ER on 7/13/17 reporting 2 months of worsening shortness of breath and maximal exercise tolerance of < 1 block. Echocardiogram showed ejection fraction $< 15\%$ with global hypokinesis of the left ventricle and severely reduced right ventricular systolic function. The patient's cardiac function progressively declined during his hospital stay, eventually requiring intra-aortic balloon pump placement. The decision was made to place an LVAD on 7/27/17 as a bridge to heart transplant. Patient did well post-operatively and was discharged home on 8/11/17.

Patient was not eligible for heart transplant due to his obesity (247 lbs, BMI 39.9), so he was referred to our Bariatric Clinic. He was only able to lose 12 pounds with diet and lifestyle modifications, so the decision was made to take him to the operating room for laparoscopic sleeve gastrectomy on 10/23/20.

Two weeks post-operatively, an echocardiogram demonstrated an ejection fraction of 20–25%, and ramp study demonstrated EF improvement to 30% as LVAD speed was decreased, both suggesting left ventricular recovery. At his two-month follow up visit, patient was down to 188 lbs (BMI 30.3) from his preoperative weight of 235 lbs (BMI 37.9). He reported feeling energized without any dyspnea or orthopnea. The patient's cardiology team began considering LVAD explantation in 2/2021 when his EF improved to 35%. By 5/2021, his weight was down to 167 lbs (BMI 27.5). Repeat ramp study in 6/2021 redemonstrated an EF of 35% with minimal change in hemodynamics with weaning down the LVAD speed.

It was determined that the patient's intrinsic cardiac activity had recovered enough to be eligible for LVAD explantation. His LVAD was successfully explanted on 7/8/21, and his post-explant EF was 40–45%. Patient has done well since explantation. He no longer requires a heart transplant.

P069

Retrospective Evaluation of Opioid Use in Post Bariatric Surgical Interventions

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The purpose of this quality improvement project was to evaluate opioid utilization post bariatric surgery at South Shore University Hospital in an attempt to minimize use of opioid medication and determine pathways to reduce the amount of opioids prescribed post-surgical intervention.

A retrospective chart review was conducted between 12/1/2019 and 12/31/2020 in patients who were post bariatric surgery (gastric band, sleeve gastrectomy, or Roux-en-Y gastric bypass) at a new Bariatric program. Standard (ERP) protocols were used involving patient and surgical team education, long acting local anesthesia protocol including bupivacaine mixture, and non-opioid medications for pain relief including acetaminophen and intravenous NSAIDS. Varying doses and classes of opioids were converted into Morphine Milligram Equivalents (MME). Patients were excluded if they were already being treated with opioids prior to surgery for other chronic illnesses.

A total of 45 patient charts were reviewed and 41 patients met inclusion criteria. Five out of 41 patients (12%) received zero opioids post-operatively, 34 patients (83%) received between 7.5 and 20 MME per dose in PACU, and two patients (4.9%) both received 10 MME on the surgical floor. Zero patients were discharged home with a prescription for narcotics.

With the use of our protocol, patients post bariatric surgery at our institution had minimal to no use of morphine milligram equivalents post discharge from PACU. Next steps for our program would be to further minimize opioid use post surgical intervention, utilize the lowest possible opioid dose in PACU, review opioid use with prescribers, and to standardize post-operative pain management education.

P070

Recurrence of Jejuno-Jejunal Intussusception After RNYGBP Requiring Anastomotic Resection and Reconstruction

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We present a case of a 43-year-old female with a surgical history of Roux en Y Gastric Bypass 5 years ago at an outside facility and a laparoscopic reduction of a jejuno-jejunal intussusception 3 months prior, who was brought to our ED for severe abdominal pain associated with blood-tinged emesis. Her abdominal exam elucidated diffuse tenderness with peritonitis. She was intermittently bradycardic and hypothermic with normal blood pressure. Laboratory findings were significant for leukocytosis of 11.1 and a lactate of 4.2. A CT showed dilated bowel near the jejuno-jejunal anastomosis associated with mesenteric swirling, pneumatosis, and adjacent extraluminal gas. She was taken to the OR for resection of the jejuno-jejunal anastomosis and creation of roux to common channel anastomosis and common channel to biliopancreatic limb anastomosis.

P071

Gastric Remnant Outlet Obstruction: Will it Become a GROO-ing Problem?

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Gastric outlet obstruction can be caused by several etiologies—including peptic ulcer disease, caustic ingestion, or even malignancy[1]. Within the field of bariatric surgery, gastric outlet obstruction was historically a complication from vertical banded gastroplasty[2]. In the current era of Roux-en-Y gastric bypass, the gastrojejunostomy is most often the site of obstruction while the defunctionalized gastric remnant usually lays dormant without issues. Rarely, however, the remnant outlet can obstruct, which becomes a complex management issue due to its rarity and out-of-circuit anatomy. Thus far, there are few reports of gastric remnant outlet obstruction (GROO). Though GROO may be rare, it can be a very serious and complex condition. Therefore, it is pertinent that the pathology be readily identified and an organized treatment plan be undertaken.

We present a series of three unique cases of GROO in patients who were many years postoperative from laparoscopic gastric bypass. All three patients were African American females between the ages of 40–65 who underwent gastric bypasses in the early 1990s. The first case describes a patient with polycystic kidneys causing a mechanical obstruction of her gastric remnant.The second patient underwent surgical treatment as the obstruction was found to be from a

hypertrophic pylorus which obliterated the pyloric lumen (Fig. 1). The final case appeared to be an idiopathic obstruction due to initial negative imaging. However, further work-up revealed a peri-hilar malignancy. Overall, the approach to management was either endoscopic, radiological, surgical, or a combination. Patients reported symptom improvement after undergoing intervention, as their symptoms were from the mass effect of a severely dilated gastric remnant. Even though the reported incidence of GROO is low, there may actually be more cases given the increase in performance of Roux-en-Y gastric bypass since the mid 1990s[3]. Thus, an algorithmic management strategy for diagnosis and treatment of GROO will help to avoid missed diagnoses and more serious outcomes.

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P073

Is the Staple Line Reinforcement in Davinci Robotic Sleeve Gastrectomy Feasible and Safe? What did we Learn from the First Consecutive 50 Cases?

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Background: The staple line reinforcement in laparoscopic sleeve gastrectomy is the first of choice for many experienced bariatric surgeons. Despite the increased popularity of the DaVinci Platform in bariatric surgery, the benefits of its revolutionary Sureform Staple Technology combined with SLR had not been well evaluated.

Objectives: By presenting our early results with DaVinci Stapling Technology in robotic sleeve gastrectomy (RSG) combined with SLR, we aim to demonstrate its safety and feasibility.

Methods: All laparoscopic sleeve gastrectomy (LSG) and robotic sleeve gastrectomy (RSG) between April 2021 and September 2021 were reviewed. Demographic factors (age, body mass index, gender, comorbidities), stapling related data (sequence, reload types, reinforcement materials) were recorded. Primary outcomes include staple line complications (bleeding, leak, troubleshooting) and 30-days excess weight lost. Secondary outcomes were hospital length of stay, 30-days readmission, 30-days morbidity. SPSS was used for statistical analysis. $P < 0.05$ was considered statistical significance.

Results: There were 56 LSG and 50 RSG. No statistical difference in age, gender, comorbidity, pre-operative BMI, 30-days-post-op-BMI, length of stay between 2 groups. Compared to LSG, RSG had a longer procedure time (99 ± 26.05 min vs 60.70 ± 17.52 min, $p < 0.0001$). Console time was 81.25 ± 23.69 min. No return to the operating room within 30-days. No statistical difference in 30-days-readmission or emergency room visits within 30 days after the procedure. LSG group was more likely to be discharged with home intravenous fluids (7.3% vs 0%, $p = 0.02$). The robotic group was sub-categorized into Force-Fire group (27 cases) and No-Force-Fire group (23 cases). No statistical difference in age, gender, comorbidity, pre-operative BMI, 30-days-BMI, console time, and length of stay between Force-Fire group versus No-Force-Fire group.

Conclusions: Robotic sleeve gastrectomy with staple line reinforcement is a safe and feasible alternative for laparoscopic sleeve gastrectomy. Intraoperative alert when Force Fire was used was not associated with any adverse event. We suggest that the optimal sequence of staple lines with reinforcement material in the robotic platform should start with 2 black loads followed by green load.

P074

GERD and Barrett's Esophagus may not be Contraindicated for a Sleeve Gastrectomy?

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Background: Standard of care is to offer a Roux-en-Y gastric bypass (RYGB) to patients with GERD and Barrett's esophagus. The incidence and progression of GERD and Barrett's esophagus is not well understood. The aim of our study is to review our long-term results.

Methods: The Metabolic and Bariatric Surgery Quality Improvement Program (MBSAQIP) Data Registry identified laparoscopic adjustable gastric band (LAGB), laparoscopic sleeve gastrectomy (LSG) and LRYGB between January 2007 to December 2019 by a single surgeon. We sought to determine the incidence of GERD and Barrett's esophagus, resolution of GERD, conversion to RYGB for worsening GERD, and biopsy proven progression to dysplasia and esophageal cancer.

Results: there were total 381 LAGB, 856 LSG, 270 LRYGB. Mean follow-up time was 44 months. There was 121 pre-operative EGD (8%), 208 surveillance EGD. Pre-operative biopsy proven Barrett's esophagus with no dysplasia (n = 3) underwent LSG. One had Barrett resolution at 4th EGD but had recurrent Barrett with no dysplasia at 6th EGD without GERD symptoms. Other two LSG reported improvement in GERD symptoms. There were 14 de novo Barrett's esophagus with no dysplasia, 5 from LAGB (1.31%), 5 from LSG (0.58%), 4 from RYGB (1.48%). 5 of those 14 (36%) were diagnosed at 2nd year EGD. Only one de novo Barrett with no dysplasia from RYGB progressed to severe dysplasia at 3rd EGD but achieved regression to no dysplasia in 5th and 7th EGD. Only 3 de novo Barretts had pre-operative GERD, and 2 of those had screening EGD. All de novo Barretts denied post-operative GERD symptoms. No conversion to RYGB due to GERD symptoms. 2 LAGB conversions to sleeve due to GERD symptoms. No difference in pre-operative GERD (RYGB 25.9% vs LAGB 22.8% vs LSG 25.4%), and in GERD improvement among three groups over 8 years follow-up (RYGB 2.9% vs LAGB 4.5% vs LSG 5.2%, p = 0.586). No difference in endoscopic and pathological findings of Barrett's esophagus and GERD among three groups, regardless the pre-operative status of GERD. In this study, there was no progression to severe dysplasia or esophageal cancer.

Conclusions: Preoperative diagnosis of Barrett's esophagus need not be an absolute contraindication for sleeve gastrectomy. Progression of GERD symptoms and Barrett's esophagus is not higher with sleeve gastrectomy compared to laparoscopic band and gastric bypass. Routine EDG may detect higher incidence of Barrett's than in this retrospective study.

P075

A 5-Year Propensity-Matched Analysis of Perioperative Outcomes in Patients with Chronic Kidney Disease Undergoing Bariatric Surgery

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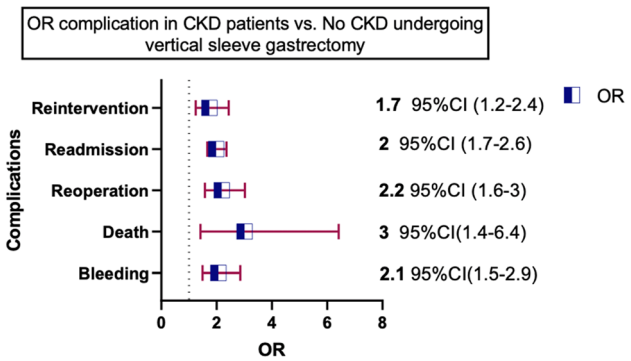
Introduction: Bariatric surgery can improve renal function in patients with comorbid chronic kidney disease (CKD) and obesity. Additionally, bariatric surgery can facilitate better outcomes following renal transplantation in patients with obesity. The safety of bariatric surgery in patients with CKD has been previously debated in the literature. This study evaluates the frequency of perioperative complications in patients with CKD undergoing primary bariatric surgery.

Methods and Procedures: The MBSAQIP database was queried from 2015–2019. Patients were included if they had Sleeve gastrectomy (VSG) or Roux-en-Y gastric bypass (RYGB) and were stratified based on CKD status. An unmatched and propensity-matched analysis was performed comparing perioperative outcomes between the groups.

Results: From 2015–2019, MBSAQIP showed that 61% of the patients underwent VSG and 25% underwent RYGB with a total of 717,809 patients included in this study, 5817 (0.8%) had CKD, of whom 2266 (0.3%) were on chronic dialysis. 74.3% of patients with CKD underwent VSG with 25.7% underwent RYGB. In matched analysis comparing RYGB to VSG, patients who underwent RYGB had a higher rate of deep organ space infection (0.7%vs. 0.1%, OR, 5; 95%CI (1.1–22.9),p = 0.021) and re-intervention (2.2%vs. 5.0%,OR,2.3; 95%CI(1.5–3.5),p < 0.001). Within the VSG cohort, a matched analysis was performed for those with CKD and without CKD. The CKD cohort had higher risk of complications such as bleeding (2.1%vs. 0.9%,OR,2.1; 95%CI(1.5–2.9),p < 0.001), readmission (9.3%vs. 4.9%,OR, 2; 95%CI(1.7–2.6),p < 0.001), reoperation (2.7%vs. 1.3%,OR, 2.2; 95%CI(1.6–3),p < 0.001) and need for reintervention (2.2%vs. 1.3%,OR,1.7; 95%CI(1.2–2.4),p < 0.001). Notably, patients with CKD also had a higher mortality (0.6%vs. 0.2%, OR, 3; 95%CI (1.4–6.4), p = 0.003). Furthermore, dialysis didn't show any significant effect on perioperative outcomes.

Conclusions: VSG has been the operation of choice in patients with CKD. Our results showed it is the safer option in patients with CKD when compared to RYGB. Although this patient population does have increased risk of adverse perioperative events, dialysis didn't affect the outcome. Bariatric surgeons who choose to operate on patients with CKD should be well informed and remain vigilant given the increased perioperative risk. The risk is still considerably low and given the potential benefit on renal function and improvement in candidacy for renal transplant, they should be considered as surgical candidates.



P076

A Survey of Men's Attitudes Towards Bariatric Surgery

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Background: Although population studies suggest men and women have equal levels of obesity, men constitute less than 20% of all patients undergoing bariatric surgery (MBS). Men who do undergo surgery tend to have more severe disease, resulting in higher serious morbidity and mortality. This study explores eligible men's perspective on body weight, weight loss, and health in order to understand their marked underutilization of MBS.

Research Methods: We recruited 60 men from the community. Potential participants were screened for a body mass index (BMI) greater than 40 or a BMI greater than 35 with existing medical conditions. Qualifying men were given a 23 item survey online or in person. Results were analyzed using descriptive statistics.

Results: 68% of sample was AA (n = 41), mean age of 47.9 (sd). Most men believe that maintaining a healthy body weight was important to their health (n = 23). Their ideal size was a class 1 obese male figure. Men were very dissatisfied to dissatisfied by their current body size (46% n = 28). Most (76%) felt they were overweight or obese, and tried to change their diet and exercise. Men who felt they were obese, were more likely to be white or had be told they were obese by others. Only 86% of men said they ever talked with PCP about their weight, more white men spoke with PCP($p < 0.001$). Those who were told were given target weight and advise on diet and exercise. Most felt strongly their doctors were respectful. Only 14% of patients said doctors should refer patients to MBS, more whites felt providers should recommend MBS. However, 31.4% of men do not believe MBS is safe or effective, and 20% are neutral, and 51% were not willing to consider it for themselves.There was no difference between AA and non AA men regarding safety and efficacy of MBS ($p = 0.065$).

Conclusion: Most obese men value their health, want to lose weight, and have an ideal body size that is lower than their current body size, but still obese. Regardless of race 50% of men in the survey were unwilling to try bariatric surgery, and there was no difference in perceived safety and efficacy between blacks or white men.

P077

Effect of Bariatric Surgery on Non Alcoholic Fatty Liver Disease in morbidly Obese Patients

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Introduction: Out of the various co-morbidities associated with obesity, non-alcoholic fatty liver disease (NAFLD) is the most common cause of chronic liver disease with an estimated prevalence of 25 – 30%. Bariatric surgery is the most effective modality of weight loss in morbidly obese patients and therefore should also theoretically improve the liver dysfunction associated with obesity. This study was designed to study the effect of bariatric surgery on NAFLD in obese patients.

Methods: This prospective study was planned on 20 patients being operated for morbid obesity in a tertiary care teaching hospital in New Delhi over a period of 1 year. A standard pre-operative workup including transient hepatic elastography (THE) and NAFLD ridge score calculation was done for all the participants. Patients underwent either laparoscopic sleeve gastrectomy or laparoscopic mini gastric bypass depending on the merits of each case. A core needle biopsy of the liver was performed intra-operatively in all the patients to correlate with preoperative THE values. The THE, liver function tests, lipid profile and NAFLD ridge score were repeated at 1 month and at 3 months after surgery.

Results: Out of a proposed sample of 20, the study could include only 13 patients due to the repurposing of the hospital as a Covid-19 facility. Out of these, 10 patients had obstructive sleep apnoea, while 4 patients each had diabetes mellitus and hypothyroidism. The mean preoperative BMI, THE and NAFLD ridge score were 42.85 ± 3.1), 12.37 ± 3.03 and 1.01 ± 0.44 respectively. Four patients had a NAS score of 3 on liver biopsy, while three patients had a NAS score of 4 ($p = 0.666$ on comparison with preoperative THE). The mean BMI showed a statistically significant decrease to 35.25 ± 2.75 at 3 months ($p < 0.05$). Transient hepatic elastography ($p = 0.001$), liver function tests ($p = 0.001$), HbA1c ($p < 0.01$) and lipid profile ($p = 0.001$) also showed significant improvement at 3 months. NAFLD ridge score decreased significantly to 0.47 ± 0.22 over this period ($p = 0.001$). All the patients had a resolution or improvement in their preoperative comorbidities.

Conclusion: This study shows that bariatric surgery not only results in a statistically significant improvement in BMI in morbidly obese patients, but in short term, also in pre-existing NAFLD as measured by THE, LFTs and NAFLD ridge score. More studies with a larger sample size and a longer follow up are needed to substantiate these results.

P078

Post-operative Outcomes After Laparoscopic Duodenoenterostomy for Bariatric Surgery Utilizing an End-to-End Circular Stapler and Transoral Anvil Deployment Device

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Introduction: The laparoscopic biliopancreatic diversion with duodenal switch (BPD-DS) has been shown to carry high success rates in the treatment of morbid obesity. Laparoscopic creation of the duodenoenterostomy is one of the more technically difficult steps of the operation. Historically this anastomosis has been created via a linear stapling or hand sewn approach. The aim of this study is to look at the 30-day post-surgery outcomes in patients who underwent creation of this anastomosis utilizing an end-to-end anastomosis (EEA) circular stapler and transoral anvil deployment device.

Methods and Procedures: A retrospective review at a single institution was performed on patients who underwent laparoscopic bariatric surgery requiring duodenoenterostomy between January 2018 and September 2020. The duodenoenterostomy was created with the assistance of a 21 mm EEA circular stapler and transoral anvil deployment device after the completion of the sleeve gastrectomy. Post-operative 30-day major and minor complications were documented. Major complications included bleeding/transfusion, stricture, ulcer, anastomotic leak, and surgical site infection. Minor complications included abdominal pain, ileus, urinary tract infection, splenic infarct, rectal bleeding, and hypoglycemia.

Results: A total of 61 patients underwent laparoscopic bariatric surgery requiring duodenoenterostomy during the study period. The mean (SD) age of patients was 46 (SD = 10) years, 85% were female, and the mean BMI was 48.7 kg/m2 (SD = 4.1). At 30-days post-surgery, 8 (13.1%) patients had minor complications, 1 (1.36%) patient had a major complication of bleeding requiring blood transfusion. There were no strictures, ulcers, or leaks. There were 4 (6.56%) patients re-admitted but none of these patients required re-operation.

Conclusion(s): This study shows that the use of an EEA circular stapler and transoral anvil deployment device to perform a laparoscopic duodenoenterostomy during bariatric surgery is safe with an acceptable 30-day major complication rate. Long-term follow-up data is required to determine the long-term safety of this technique.

P080

The Effect of Linear Stapled Gastrojejunostomy Size in Roux-eT-Y Gastric Bypass

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Objective of the Study: The purpose of this study was to determine whether linear stapled gastrojejunostomy (GJ) anastomosis size affects Roux-et-Y gastric bypass (RYGB) outcomes. The linear stapled GJ has overtaken the circular method and become the most commonly performed GJ technique in Canada and worldwide. However, there is still significant variability in practices regarding the size of stapler used, with the 30 mm or 45 mm being the most common. The objective of this study was to determine whether weight loss or complications differ with 30 mm versus 45 mm GJ size.

Methods and Procedures: This is a retrospective cohort study including 6,135 consecutive patients who underwent surgery from Jan 2010 to May 2020. All included patients either had a 30 mm (n = 4,336) or 45 mm (n = 1799) linear stapled GJ. Pertinent patient data was obtained from the Ontario Bariatric Network Registry. GJ size and bypass limb lengths were confirmed with each individual surgeon included in the study. Among several requirements, the OBN mandates that each surgeon performs a minimum annual volume of 50 bariatric cases and a minimum institutional annual volume of 120 bariatric cases.

The primary outcome was weight loss at 1 year. Secondary outcomes included weight loss beyond 1 year, stenosis and rates of reoperation. The groups were compared using t-tests, and an ANOVA analysis was used for our final model. Statistical significance was defined as $p < 0.05$.

Results: The 45 mm group had statistically better weight loss, but without clinical significance. Percent total weight loss (%TWL) at 1 year for the 30 mm and 45 mm group were 31.02% and 32.18% respectively (mean difference = 1.16% [C.I. 0.68, 1.64]; $p < 0.001$). When adjusting for baseline BMI, waist circumference, age, gender, and total limb length, %TWL at 1 year were 30.21% and 31.27% respectively (mean difference = 1.06% [C.I. 0.23, 1.89]; $p = 0.01$). Stenosis rates at 1 year for the 30 mm and 45 mm group were 1.13% (n = 4) and 4.35% (n = 5) respectively. Unadjusted %TWL at 3 years for the 30 mm and 45 mm group were 29.51% and 30.16% respectively.

Conclusion: Due to the very large sample size, a statistically significant difference in TWL was detected, favouring the 45 mm GJ. However, the differneces in weight loss are not clinically meaningful. Both the 30 mm and 45 mm linear stapled GJ provide excellent sustained weight loss.

P081

One-Versus Two-Stage Conversion of Failed Adjustable Gastric Band to Laparoscopic Sleeve Gastrectomy: Analysis of Outcomes and Costs

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Introduction: Conversion of an adjustable gastric band (AGB) to laparoscopic sleeve gastrectomy (LSG), performed either as a one- or two-stage procedure, is technically feasible. Our objective was to compare outcomes and costs of one- versus two-stage conversion of AGB to LSG.

Methods and Procedures: Between January 2012 and June 2021, 87 patients underwent conversion from AGB to LSG at our institution. A retrospective review examined operative time, length of stay, payments, and weight loss trends. Comparisons were performed by 2-tailed Student's t test and repeated measures of ANOVA using R version 3.6.3.

Results: 36 patients underwent one-stage procedures, while 51 patients underwent two-stage. Mean operative time was 141.31 (SD of 30.57) minutes for one-stage (N = 36) and 197.91 (SD of 62.92) minutes for two-stage (N = 43). Mean length of stay was 2 (SD of 1) nights for one-stage (N = 36) and 4 (SD of 3) nights for two-stage (N = 43). Average payment for one-stage was $3075.04 (SD of $1011.26) and $3930.32 (SD of $1342.51) for two-stage. Differences in operative time, length of stay, and payment were all statistically significant ($p < 0.01$). Among one-stage patients (N = 29), BMI was 44.17 (SD of 5.54) kg/m2 at the time of surgery, 41.62 (SD of 5.02) kg/m2 at two weeks post-procedure, and 39.18 (SD of 4.97) Kg/m2 at three months post-procedure. Among two-stage patients (N = 46), BMI was 45.43 (SD of 5.43) kg/m2 at the time of surgery, 442.78 (SD of 5.39) kg/m2 at two weeks post-procedure, and 39.68 (SD of 5.13) Kg/m2 at three months post-procedure. The change in BMI between both groups was not significant ($p = 0.43$). The most common reason for band removal among one-stage patients was "failure to lose weight," compared to "band prolapse" and "reflux" among two-stage patients.

Conclusions: Compared to two-stage conversion of AGB to LSG, a one-stage procedure offers significantly shorter total operative time and length of hospital stay. Professional and hospital revenue was significantly higher for the two-stage operation. Interestingly, patients in our study did not gain appreciable weight while waiting for sleeve gastrectomy in the two-stage group, suggesting that there is no significant clinical benefit for pursuing a one-stage over a two-stage procedure. However, given the decreased operative time, decreased length of stay, and decreased cost to the patient, a one-stage procedure is preferable and should be favorably considered by the bariatric medical community.

P082

Double Blind Randomized Controlled Trial of Pregablin Before Gastric Bypass

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Introduction: The role of adjuvant neuropathic pain medication as part of routine ERAS protocol in reducing opiate use for bariatric surgery remains unclear. We performed a trial of preoperative pregabalin in patients undergoing scheduled laparoscopic gastric bypass for morbid obesity focusing on post-operative opiate use trends.

Methods and Procedures: A double blind randomized control trial of single dose preoperative 75 mg pregabalin was performed between February 2013 and October of 2015 on patients undergoing primary laparoscopic Roux-En-Y Gastric Bypass. Variables included participant demographics, length of stay (LOS), post-operative morphine milligram equivalent (MME) dose of opiates, and adjuvant pain therapies. Continuous variables are reported as averages.

Results: A total of 61(33 control vs 28 Pregabalin) patients were randomized and completed the study protocol.

	Control (N = 33)	Pregabalin (N = 28)	P Value
Age (yrs)	57.1	55.3	0.26
Sex (%F)	79%	71%	0.51
Weight (kg)	140.7	130.5	0.32
BMI	49.8	46.7	0.34
OR Time (Mins)	183.6	174.1	0.80
MME POD 0	17.3	13.8	0.10
MME POD 1	46.6	40.9	0.23
MME POD 2	29.7	33.6	0.31
LOS (Days)	2.2	2.2	0.35

Conclusion: A single dose of Pregabalin 75 mg does not result in a clinically or statistically significant decrease in opiate use after Laparoscopic Gastric Bypass.

P083

Clinical Characteristics of Surgical Patients with Obesity Vary by Health Insurance Status

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Background: In the current obesity epidemic, every surgical practice now must manage patients with severe excess weight. For non-bariatric surgeons confronted with these medically fragile patients, every clinical insight contributes to good outcomes. Objective: to identify pre-operative variations by health insurance status across the spectrum of weight, BMI and 33 co-morbidities among surgical patients with obesity.

Methods: Data from 146,159 pre-operative Surgical Review Corporation BOLD bariatric surgery patients were analyzed in five groups: Medicare (n = 16,347), Medicaid (n = 5,115), Private (n = 117,612), Self Pay (n = 7,085). Data included demographics, weight, BMI, and 33 obesity co-morbidities. Statistics: Chi-square and ANOVA.

Results: Medicare/Medicaid/Private/Self age (56 + -12/40 + -11/44 + -11/44 + -12), weight (133 + -0.2/136 + -0.4/129 + -0.1/129 + -0.3 kg), BMI (47 + -0.1/49 + -0.1/46 + -0.02/45 + -0.1), % women (74/86/78/77), % African-American (12/17/11/4), % Caucasian (78/61/76/83), % Hispanic (5/16/7/9) varied by insurance ($p < 0.0001$). 33 obesity co-morbidities varied by insurance. Medicare had highest incidence of 24, including CHF, CAD, hypertension, sleep apnea, diabetes, dyslipidemia, and musculoskeletal pain. Medicaid was highest in 7, Private in 2 (alcohol use, PCOS), Self in 0. Medicaid had the highest incidences of asthma, abdominal panniculitis, pseudotumor cerebri, liver disease, tobacco abuse, substance abuse, and mental health diagnoses. Obesity co-morbidities by health insurance are listed in Fig. 1.

Conclusions: In surgical patients with obesity, weight-related medical conditions vary dramatically by health insurance status. Of the 33 obesity co-morbidities evaluated, 24 were most prevalent in Medicare, including the highest rates of cardiopulmonary diseases, metabolic problems, somatic complaints, and hepatobiliary co-morbidities. These finding may relate to increased Medicare age. Medicaid subscribers suffered the highest incidences of asthma, mental health diagnosis, liver disease, and tobacco and substance abuse. Private insurance users had the highest rate of alcohol abuse and PCOS. Self-Pay patients were not highest in any obesity co-morbidities. These results suggest that for all surgeons who must operate upon patients with obesity, health insurance status could be a tool for risk stratification in the pre-operative preparation of surgical patients with obesity, and in prospective per-operative management, especially for high-risk Medicare and Medicaid individuals. Although patients with obesity in this study were self-selected by choosing bariatric surgery, since patients evaluated covered the spectrum of clinical characteristics in obesity, the observations here may be applicable to other similar surgical patients. Our review of the literature indicates that these clinical variations by health insurance in a large population of surgical patients with obesity have not been reported previously and are significant findings of this study.

Table 1: Obesity Co-Morbidities by Health Insurance in Surgical Patients.

		(% incidence, p value)					
		Medicaid vs Medicare	Medicaid vs Private	Medicaid vs Self	Medicare vs Private	Medicare vs Self	Private vs Self
CARDIOPULMONARY AND METABOLIC COMORBIDITIES	Congestive Heart Failure	3.07/7.22, p<.0001	3.07/1.38, p<.0001	3.07/0.95, p<.0001	7.22/1.38, p<.0001	7.22/0.95, p<.0001	1.38/0.95, p=0.0024
	Hypertension	54.12/77.13, p<.0001	54.12/56.35, p=0.0016	54.12/47.95, p<.0001	77.13/56.35, p<.0001	77.13/47.95, p<.0001	56.35/47.95, p<.0001
	Angina	4.34/5.7, p=0.0002	4.34/2.24, p<.0001	4.34/1.69, p<.0001	5.7/2.24, p<.0001	5.7/1.69, p<.0001	2.24/1.69, p=0.0023
	Peripheral Vascular Disease	1.33/3.17, p<.0001	1.33/0.89, p=0.0012	1.33/0.58, p<.0001	3.17/0.89, p<.0001	3.17/0.58, p<.0001	0.89/0.58, p=0.007
	Pulmonary Hypertension	4.54/6.06, p<.0001	4.54/4.16, p=0.187	4.54/2.6, p<.0001	6.06/4.16, p<.0001	6.06/2.6, p<.0001	4.16/2.6, p<.0001
	Asthma	26.12/24.46, p=0.0164	26.12/16.25, p<.0001	26.12/12.05, p<.0001	24.46/16.25, p<.0001	24.46/12.05, p<.0001	16.25/12.05, p<.0001
	Obstructive Sleep Apnea	50.15/57.59, p<.0001	50.15/43.52, p<.0001	50.15/33.87, p<.0001	57.59/43.52, p<.0001	57.59/33.87, p<.0001	43.52/33.87, p<.0001
	Obesity Hypoventilation Syndrome	2.28/4.59, p<.0001	2.28/1.45, p<.0001	2.28/1.19, p<.0001	4.59/1.45, p<.0001	4.59/1.19, p<.0001	1.45/1.19, p=0.0733
	Deep Vein Thrombosis/ Pulmonary Embolism	3.28/6.04, p<.0001	3.28/2.3, p<.0001	3.28/1.55, p<.0001	6.04/2.3, p<.0001	6.04/1.55, p<.0001	2.3/1.55, p<.0001
	Coronary Artery Disease	3.56/11.35, p<.0001	3.56/3.53, p=0.9235	3.56/2.34, p<.0001	11.35/3.53, p<.0001	11.35/2.34, p<.0001	3.53/2.34, p<.0001
	Lower Extremity Edema	32.55/40.44, p<.0001	32.55/26.2, p<.0001	32.55/20.71, p<.0001	40.44/26.2, p<.0001	40.44/20.71, p<.0001	26.2/20.71, p<.0001
ABDOMINAL/HEPATOBILIARY AND DIGESTIVE/MUSCULOSKELETAL COMORBIDITIES	Abdominal Hernia	6.9/8.32, p=0.0011	6.9/4.8, p<.0001	6.9/3.99, p<.0001	8.32/4.8, p<.0001	8.32/3.99, p<.0001	4.8/3.99, p=0.0019
	Cholelithiasis	24.22/28.77, p<.0001	24.22/19, p<.0001	24.22/14.59, p<.0001	28.77/19, p<.0001	28.77/14.59, p<.0001	19/14.59, p<.0001
	GERD	49.89/53.76, p<.0001	49.89/45.78, p<.0001	49.89/39.59, p<.0001	53.76/45.78, p<.0001	53.76/39.59, p<.0001	45.78/39.59, p<.0001
	Abdominal Panniculitis	11.24/10.08, p=0.0175	11.24/6.25, p<.0001	11.24/5.73, p<.0001	10.08/6.25, p<.0001	10.08/5.73, p<.0001	6.25/5.73, p=0.0768
	Liver Disease	7.7/7.32, p=0.357	7.7/6.2, p<.0001	7.7/3.57, p<.0001	7.32/6.2, p<.0001	7.32/3.57, p<.0001	6.2/3.57, p<.0001
	Stress Urinary incontinence	26.88/29.96, p<.0001	26.88/22.29, p<.0001	26.88/20.4, p<.0001	29.96/22.29, p<.0001	29.96/20.4, p<.0001	22.29/20.4, p=0.0002
	Diabetes Mellitus	35.68/54.22, p<.0001	35.68/32.3, p<.0001	35.68/24.69, p<.0001	54.22/32.3, p<.0001	54.22/24.69, p<.0001	32.3/24.69, p<.0001
	Gout	5.42/7.19, p<.0001	5.42/3.18, p<.0001	5.42/2.15, p<.0001	7.19/3.18, p<.0001	7.19/2.15, p<.0001	3.18/2.15, p<.0001
	Menstrual Irregularity	24.67/29.58, p<.0001	24.67/22.15, p<.0001	24.67/17.08, p<.0001	29.58/22.15, p<.0001	29.58/17.08, p<.0001	22.15/17.08, p<.0001
	Dyslipidemia	35.27/57.66, p<.0001	35.27/40.35, p<.0001	35.27/34.82, p=0.6081	57.66/40.35, p<.0001	57.66/34.82, p<.0001	40.35/34.82, p<.0001
	Polycystic Ovarian Syndrome	5.34/2.23, p<.0001	5.34/5.56, p=0.4897	5.34/5.24, p=0.8059	2.23/5.56, p<.0001	2.23/5.24, p<.0001	5.56/5.24, p=0.2432
	Pseudotumor Cerebri	2.64/1.87, p=0.0007	2.64/1.8, p<.0001	2.64/1.2, p<.0001	1.87/1.8, p=0.5438	1.87/1.2, p=0.0003	1.8/1.2, p=0.0002
PSYCHOLOGICAL/ SOMATIC COMORBIDITIES	Alcohol Use	20.55/20.33, p=0.7337	20.55/33.75, p<.0001	20.55/33.48, p<.0001	20.33/33.75, p<.0001	20.33/33.48, p<.0001	33.75/33.48, p=0.6695
	Tobacco Use	9.03/6.85, p<.0001	9.03/6.31, p<.0001	9.03/7.27, p=0.0004	6.85/6.31, p=0.0075	6.85/7.27, p=0.2494	6.31/7.27, p=0.0013
	Substance Abuse	0.9/0.64, p=0.0498	0.9/0.36, p<.0001	0.9/0.45, p=0.0027	0.64/0.36, p<.0001	0.64/0.45, p=0.0892	0.36/0.45, p=0.2376
	Psychological Impairment	26.31/27.29, p=0.1709	26.31/14.69, p<.0001	26.31/14.3, p<.0001	27.29/14.69, p<.0001	27.29/14.3, p<.0001	14.69/14.3, p=0.3651
	Mental Health Diagnosis	18.48/18.26, p=0.7288	18.48/9.34, p<.0001	18.48/8.86, p<.0001	18.26/9.34, p<.0001	18.26/8.86, p<.0001	9.34/8.86, p=0.1797
	Depression	44.01/46.71, p=0.0007	44.01/32.49, p<.0001	44.01/31.47, p<.0001	46.71/32.49, p<.0001	46.71/31.47, p<.0001	32.49/31.47, p=0.0771
	Fibromyalgia	4.67/8.23, p<.0001	4.67/2.59, p<.0001	4.67/1.88, p<.0001	8.23/2.59, p<.0001	8.23/1.88, p<.0001	2.59/1.88, p=0.0002
	Back Pain	57.54/60.95, p<.0001	57.54/46.96, p<.0001	57.54/40.23, p<.0001	60.95/46.96, p<.0001	60.95/40.23, p<.0001	46.96/40.23, p<.0001
	Impaired Function	5.32/11.71, p<.0001	5.32/1.85, p<.0001	5.32/1.52, p<.0001	11.71/1.85, p<.0001	11.71/1.52, p<.0001	1.85/1.52, p=0.0484
	Musculo-skeletal Pain	46.02/57.94, p<.0001	46.02/41.96, p<.0001	46.02/35.16, p<.0001	57.94/41.96, p<.0001	57.94/35.16, p<.0001	41.96/35.16, p<.0001

P084

Outcomes Assessments of Sleeve Gastrectomy in a Diet-Induced Non-alcoholic Steatohepatitis Rats

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Background and Aim: Sleeve gastrectomy (SG) may be a valuable method of treating or improving Non-alcoholic Steatohepatitis (NASH) in the obese population. This study aimed to investigate the 12-weeks outcomes of SG in NASH induced Sprague Dawley rats.

Methods: A 12-week high fat diet-induced male Sprague–Dawley rat model of NASH (n = 24; 6 weeks of age) was randomized into three groups; SG (n = 8), Sham Surgery (SS; n = 8) and Diet; (n = 8). The SG and SS groups underwent surgery at week 12. Subsequently, all the rats in each group were fed with the standard diet until week 24. Weekly body weight and liver function blood were collected at baseline, week 12 (pre-surgical intervention) and week 24 of the study. The liver of all the rats in each group was harvested at 24 weeks and subjected to histopathological analysis.

Results: The average body weight at week 12 for the SG, SS and diet groups were 417 g (± 24.4), 397 g (± 29.87) and 391 g (± 24.15), respectively ($p > 0.05$). After 12-weeks of surgical intervention, rats in the SG group had significant weight reduction (− 16.5%; $p < 0.001$) but weight increment was seen in the SS and Diet groups; + 1.9% and + 10.0%, respectively. The SG group showed significant improvement in the serum aspartate aminotransferase (AST) and alanine aminotransferase (ALT) as compared to the SS and Diet groups ($p < 0.05$). The liver histopathological analysis was comparable in the SG and SS groups at the end of 24 weeks.

Conclusion: SG showed significant weight loss and liver function improvement in the NASH induced Sprague Dawley rat model after 3 months. A longer-term study is warranted to confirm the benefits of SG on liver histology and other clinical risk factors.

P085

5 Year Comparison of Roux-en-Y Gastric Bypass vs. Vertical Sleeve Gastrectomy for Diabetic Patients with BMI less than 50

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Introduction: Bariatric surgery is one of the most effective treatment strategies for obesity and its associated comorbidities. Previous data suggest that diabetic control is best achieved with RYGB. Whether this holds true for those presenting with lower pre-operative BMIs is not well understood.

Method: Ontario Bariatric Registry data were retrospectively reviewed to compare 5-year outcomes in diabetic patients with pre-operative BMIs less than 50 who underwent Roux-en-Y gastric bypass (RYGB) with those who underwent vertical sleeve gastrectomy (VSG) between 2010 and 2021. Outcomes were analyzed with an intention-to-treat analysis.

Results: In total, 3894 diabetic patients underwent bariatric surgery; 3419 (88%) had RYGB, and 475 (12%) underwent VSG. The average BMI was 43.4 in RYGB group and 43.8 in VSG group. At 3-, and 5-years following surgery, there were 973, and 402 RYGB patients, and 96, and 36 VSG patients, respectively, available for follow-up. At all time points following surgery, BMI was lower, and the percent of excess weight loss (%EWL) and total weight loss (%TWL) were higher in RYGB patients compared to VSG patients. In the initial years following surgery, RYGB patients had lower rates of obesity-related comorbidities. The RYGB group had a higher rate of HbA1c improvement at both 3 and 5 years of follow-up. Overall, 11 patients underwent conversion from VSG to RYGB. The most common indications were weight regain, dumping syndrome, and nausea/vomiting. One patient underwent conversion from RYGB to VSG for malnutrition.

Conclusion: Diabetic patients with pre-operative BMIs less than 50 have better diabetes control and weight loss following RYGB compared to VSG over 5 years.

Table 1.

	Follow-up	RYGB	VSG	p-value
BMI mean (SD)	Baseline	43.4 (3.9)	43.8 (4.0)	**0.0369**
	3 Years	31.2 (5.1)	34.8 (4.9)	**<0.0001**
	5 Years	31.8 (4.9)	35.3 (5.4)	**<0.0001**
% EWL mean (SD)	1 year	71.2 (22.8)	53.4 (23.1)	**<0.0001**
	3 Years	67.3 (25.3)	49.8 (24.6)	**<0.0001**
	5 Years	64.2 (24.6)	49.3 (25.3)	**0.0006**
Diabetes N (%)	Baseline	3419 (100)	475 (100)	1.000
	3 Years	418 (43.0)	55 (57.3)	**0.0070**
	5 Years	188 (46.8)	20 (55.6)	0.3117
HbA1c Mean (SD)	Baseline	7.7 (1.5)	7.6 (1.5)	0.1734
	3 Years	6.2 (1.1)	6.7 (1.3)	**<0.0001**
	5 Years	6.4 (1.1)	7.1 (1.4)	**0.0004**

P086

Impact of Chronic Immunosuppression on Bariatric Surgery Outcomes and Complications

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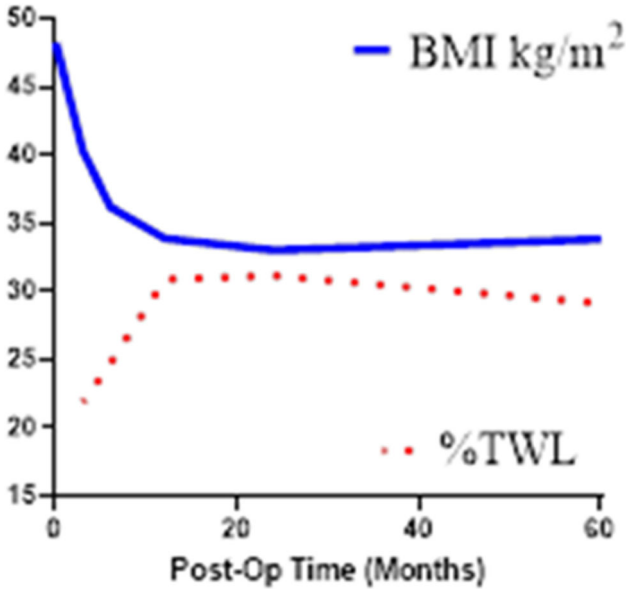
Background: Patients with obesity and diseases requiring chronic immunosuppression incur additional surgical risk with physiologic and metabolic derangements that may influence weight loss. The impact of immunosuppressant medications on bariatric surgery long term outcomes is not well elucidated.

Methods: A retrospective analysis of chronically immunosuppressed patients who underwent primary bariatric surgeries (Sleeve gastrectomy (SG), Roux en Y gastric bypass (RYGB) or biliopancreatic duodenal switch (BPD/DS)) was conducted with our institution's medical records (2008–2020). Data collected included BMI, disease and immunosuppression regimen and complications at 3, 6, 12, 24 and 60 months.

Results: A total of 91 patients on chronic immunosuppression were identified. Of the 91 patients, 54.9% had undergone a RYGB (N = 50), 38.4% had a SG (N = 35) and 6.6% had a BPD/DS (N = 6). Prednisone was used in 75.82% (N = 69) of the patients. The most common underlying disease requiring immunosuppression was rheumatoid arthritis at 21.98% (N = 20) followed by renal transplant at 19.78% (N = 18), asthma at 10.99% (N = 10) and liver transplant at 9.89% (N = 9). There was a total of 2 (2.20%) intraoperative complications. In the post-operative period, 3 cases (3.3%) of UTI, 1 case (1.10%) of pneumonia, and 6 cases (6.59%) of surgical site infections were noted. In follow-up 3 (3.30%) of patients experienced marginal ulcerations while no gastrointestinal leaks occurred. The mean pre-surgical BMI was 48.29 kg/m2 (SD = 18.41). Percent total weight loss (%TWL) and BMI reduction was 21.88% and 7.98 kg/m2 (SD = 7.82) at 3 months, 24.73% and 12.06 kg/m2 (SD = 5.31) at 6 months, 30.89% and 14.83 kg/m2 (SD = 9.07) at 12 months, 31.17% and 15.24 kg/m2 (SD = 9.79) at 24 months, 29.48% and 14.43 kg/m2 (SD = 13.46) at 60 months respectively. The mean follow up time was 30.49 months (SD = 24.19) (Table 1).

Table 1 Mean change in BMI and % weight loss from baseline

Time	Δ BMI (kg/m2)	%TWL	N
3 M	7.98	21.88	79
6 M	12.06	24.71	70
12 M	14.83	30.89	66
24 M	15.24	31.17	59
60 M	14.43	29.48	34



Conclusion: Bariatric surgery is a safe and effective treatment option for obesity in patients on chronic immunosuppression. This data supports that bariatric surgery can be performed with minimal long-term complications and sustained weight loss despite the use of immunosuppression.

P087

Correlation of Intraoperative Finding of Hiatal Hernia with Preoperative Hiatal Hernia on Upper Endoscopy in Bariatric Patients Undergoing Laparoscopic Sleeve Gastrectomy

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Introduction: Upper endoscopy is routinely used for upper gastrointestinal evaluation before bariatric surgery. Hiatal hernia is a frequent finding in obese patients on upper endoscopy. The objective of this study was to correlate preoperative presence of hiatal hernia on upper endoscopy and intraoperative finding of hiatal hernia during laparoscopic sleeve gastrectomy.

Methods: Retrospective chart review of patients who underwent laparoscopic sleeve gastrectomy with or without concomitant hiatal hernia repair between March 2020 and January 2021 from a center of excellence in Bariatric and Metabolic surgery. Preoperative presence of hiatal hernia on upper endoscopy and intraoperative presence of hiatal hernia during laparoscopic sleeve gastrectomy were analyzed. Pre-operative upper endoscopy was performed in all patients.

Results: 100 patients (24 males and 76 females) who underwent laparoscopic sleeve gastrectomy with or without hiatal hernia repair between March 2020 and January 2021 were included. The mean age was 41.15 ± 12.04 years. The mean BMI was 45.32 ± 8.34 kg/m^2. Preoperative upper endoscopy showed hiatal hernia in 39 patients (39%). 25 patients of 39 patients (25% of total patients), who had preoperative hiatal hernia on upper endoscopy also had intraoperative hiatal hernia and hiatal hernia was repaired concomitantly during sleeve gastrectomy in these patients. 13 patients of 39 patients (13% of total patients), who had preoperative hiatal hernia on upper endoscopy, had no intraoperative hiatal hernia. 41 patients (41%) who had no hiatal hernia on preoperative upper endoscopy were diagnosed with a hiatal hernia intraoperatively and hiatal hernia was repaired in all these patients. In total 66 patients (66%) had hiatal hernia identified intraoperatively and repaired concomitantly during laparoscopic sleeve gastrectomy.

Conclusion: Preoperative upper endoscopy does not diagnose hiatal hernia in all obese patient undergoing laparoscopic sleeve gastrectomy. A significant number of these patients are diagnosed with hiatal hernia intraoperatively.

P088

Small Bowel Obstruction Secondary to a Staple Line Bleed in the Post-Operative Gastric Bypass Patient- Endoscopic Management and Avoidance of an Enterotomy

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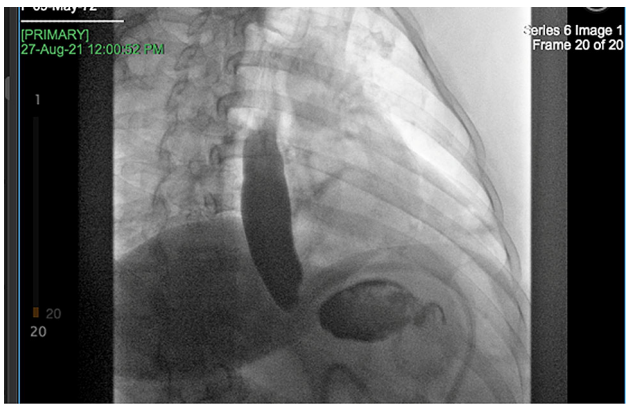
Introduction: With roux-en-y bypasses being so highly performed, post-operative complications and their management is imperative to ensure adequate patient outcomes. Bleeding is the most common major complication requiring reoperation within 30 days. However, small bowel obstructions secondary to intraluminal clot are quite rare occurring < 0.2% of the time. Many patients experiencing this complication typically present on post-operative day 2–3 with signs of obstruction and down trending hemoglobin. In many cases, imaging would show signs of obstruction, thus prompting return to OR for further investigation. This case represents a rare occurrence of a small bowel obstruction at the level of the jejunojejunostomy secondary to intraluminal bleeding. We will also describe our endoscopic management of said complication allowing for avoidance of an enterotomy, revision of the anastomosis and the morbidity associated with these procedures.

Case Report: This is a 49-year-old female who underwent a laparoscopic roux-en-y bypass for morbid obesity with associated GERD and obstructive sleep apnea. The case went uneventfully, and she recovered well. On post-operative day one, patient had abdominal pain not well controlled with typical pain regimen and several small bouts of emesis. She underwent standard upper GI which showed concern for obstruction at the level of the gastrojejunostomy (image 1). Given the concern for obstruction, the decision was made to return to the OR for a diagnostic laparoscopy and upper endoscopy. Upon entry into the abdomen, the pouch and roux limb were noted to be dilated and filled with hematoma to the level of the jejunojejunostomy. Endoscopy was then performed which demonstrated this intraluminal clot. This was broken up with a basket and successfully suctioned out revealing a small bleed from the gastrojejunostomy anastomosis. This was endoscopically clipped. Using laparoscopic guidance, the endoscope was guided into the roux limb to allow for complete removal of the intra-luminal hematoma. Afterwards, the pouch and roux limb appeared decompressed. Post-operatively, patient had return of bowel function without any concern for ongoing bleeding.



Discussion: This case shows the ability to use endoscopic techniques to successfully manage complex complications. This technique, while rarely described, allowed for swift successful evacuation of the intraluminal hematoma as well as control of bleeding. Thus, endoscopic management is not just feasible but reliable and efficient. Additionally, having a low threshold for further investigation is imperative as this complication is rare and patients may present in a variety of ways.

P089

Absorbable Polymer Matrix Staple Line Reinforcement in Robotic Versus Laparoscopic Sleeve Gastrectomy: An Analysis of Outcomes

Oliver Knoell, MD; Sarah Assali, DO; Zachary Spigel, MD; Conor Maxwell, DO; Julianna O'Toole, DO; Kellen Hayes, MD; Allegheny Health Network

Introduction: The prevention of staple line leak following laparoscopic sleeve gastrectomy (LSG) has been the focus of considerable research; however, as robot-assisted sleeve gastrectomy (RSG) becomes more prevalent, it is unclear how effectively laparoscopic technologies will translate to a robotic platform. Therefore, we evaluated the use of an absorbable polymer matrix (APM; Gore Seamguard, W.L. Gore & Associates, Inc, Flagstaff, AZ) on the occurrence of staple line leak after RSG compared to LSG.

Methods: A single-institution review of all patients undergoing RSG or LSG using APM from August 2019 through June 2021 was performed. Thirty-day outcomes were compared including readmission, DVT, PE, pneumonia, UTI, blood transfusion, surgical site infection, staple line leak, reoperation, and mortality. Normally distributed data were compared using the appropriate T-test; skewed data were compared using the Wilcoxon rank sum test.

Results: A total of 87 patients underwent RSG (46%) and 102 underwent LSG (54%). Preoperative BMI was similar between both groups (RSG: median 45, IQR 40–49, LSG: median 45, IQR 42–49, p = 0.31). Patients who underwent RSG tended to be younger (median 39 years, IQR 32–49) compared to LSG (44, IQR 34–52, p = 0.03). There were no staple line leaks in either the RSG or LSG groups (0%). There was one organ space surgical site infection in the LSG group requiring reoperation for abscess drainage (1%). There were no mortalities. There were no differences in other 30 day outcomes between the two groups.

Conclusion: The use of APM for staple line reinforcement has similar outcomes for RSG as LSG and should be considered a viable option for either approach.

P090

Indications and Outcomes for Conversion of Sleeve Gastrectomy to Roux-En-Y Gastric Bypass (RYGB)

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Introduction: Laparoscopic sleeve gastrectomy (LSG) has become the most common bariatric procedure performed in the U.S. for extreme obesity; however some patients ultimately require revision to a Roux-en-Y gastric bypass (RYGB). The objective of this study was to characterize patients undergoing conversion and indications for surgery.

Methods: Patients who underwent conversion of LSG to RYGB within the University of Pennsylvania Health System between January 2015 and August 2021 were identified. Patient demographics, operative findings, imaging, endoscopic reports, and post-operative outcomes were reported. Data were assessed using descriptive statistical methods.

Results: 63 patients underwent a revision from LSG to RYGB. The most common indications for revision were GERD (n = 43, 68.3%), followed by weight regain or inadequate weight loss (n = 17, 27.0%), and oral intolerance (n = 3, 4.7%). The cohort was predominantly female (n = 56, 89%) with mean age of 42.5 ± 9.7 years. Mean weight and BMI at time of revision was 114.7 ± 32.4 kg and 41.2 ± 9.9 kg/m2, respectively. Prior to revision, almost all patients underwent upper endoscopy and barium swallow identifying 49 (77.8%) patients with hiatal hernia, 12 (19.0%) with narrowing of the sleeve, and 11 (17.5%) with esophagitis or Barrett's esophagus.

The mean length of time between LSG and revision to RYGB was 43.9 ± 27.8 months. The average length of the procedure was 147.0 ± 52.2 min all with minimal blood loss. Most surgeries were done minimally invasively (n = 60) except for 3 open surgeries (4.8%). Average length of stay was 2.7 ± 1.2 days. Nineteen patients (30%) experienced a complication-14 were Clavien-Dindo grades I-II, 5 were grades III-IV. The most common complication was a surgical site infection requiring antibiotics (n = 6). No mortalities were reported.

After RYGB revision, 81.3% (n = 35) of patients who underwent revision for GERD noted a subjective improvement in reflux symptoms and 23.3% were able to stop their proton pump inhibitors after surgery. At a mean follow up of 15.5 ± 20.5 months, there was additional mean weight loss of 10.7 ± 13.0 kg and 19.5% excess body weight loss.

Conclusions: LSG revision to RYGB is safe and effective. Patients undergoing revision for refractory GERD had symptomatic improvement.

P091

Improvement of Hypoalbuminemia in Morbidly Obese Patients Following Laparoscopic Sleeve Gastrectomy

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Introduction: The objective of this study is to examine the effects of laparoscopic sleeve gastrectomy (LSG) on serum albumin levels in morbidly obese patients. Decreased preoperative serum albumin is a reliable predictor of postoperative morbidity and mortality. With morbid obesity being associated with chronic inflammation, we hypothesize that decreased serum albumin levels in bariatric surgery candidates is associated with an obesity related proinflammatory condition and may improve following LSG.

Methods: Prospectively collected data for consecutive 860 morbidly obese patients who had undergone LSG by a single surgeon between 2013 and 2018 was analyzed. Forty-five (5.23%) patients were found to have hypoalbuminemia preoperatively. Demographic information for these patients is shown in Table 1. Serum albumin levels at three and 12-months post-operatively were available for 26 (58%) and 12 (26.7%) of patients. In addition, C-reactive Protein (CRP) levels preoperatively (n = 43) and at 3-month (n = 22), and 12-months (n = 6) following surgery were also included as a marker of inflammation. Statistical analysis was performed using R with an alpha level of 0.05.

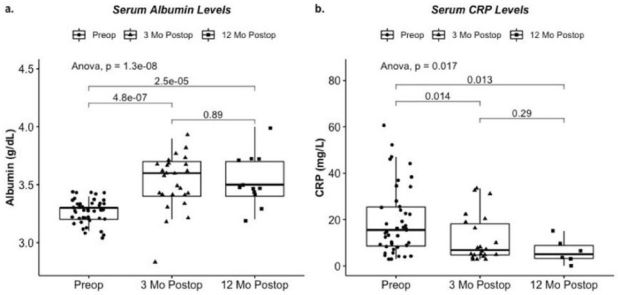
Results: Mean serum albumin levels were 3.27 g/dL, 3.52 g/dL, and 3.53 g/dL before surgery and at 3 months, and 12 months post-operatively respectively (Fig. 1a). Univariate analysis using ANOVA demonstrated a significant difference between pre- and post-operative albumin levels. Post-hoc analysis with pairwise t-tests confirmed significant differences in albumin levels preoperatively versus both 3- and 12-month after surgery. In fact, 16/26 (61.5%) and 8/12 (66.7%) patients had albumin levels return to normal range at three and 12-months respectively. Mean serum CRP levels were 19.4 g/dL, 11.7 g/dL, and 6.38 g/dL at preoperative testing and at 3 months and at 12 months after surgery respectively (Fig. 1b). One-way ANOVA demonstrated significant differences between pre- and post-operative CRP levels.

Conclusion: LSG resulted in significant normalization of both serum albumin and CRP levels in morbidly obese patients with preoperative hypoalbuminemia. This improvement may represent a reduction of inflammation following surgically induced weight loss; however, more study is needed.

Table 1.

	Patients with Hypoalbuminemia (N=45)
Sex	
F	42 (93.3%)
M	3 (6.7%)
Age	
Mean (SD)	40.0 (9.94)
Median [Min, Max]	37.0 [22.0, 62.0]
Race	
African American	33 (73.3%)
White Caucasian	5 (11.1%)
Hispanic	7 (15.6%)
BMI (kg/m2)	
Mean (SD)	47.1 (5.54)
Median [Min, Max]	47.0 [36.0, 61.0]
Weight (Lbs.)	
Mean (SD)	284 (41.8)
Median [Min, Max]	282 [203, 404]

Figure 1.



P092

Robotic-Assisted Versus Laparoscopic Sleeve Gastrectomy: An Analysis of Outcomes and Feasibility

Oliver Knoell, MD; Sarah Assali, DO; Zachary Spigel, MD; Conor Maxwell, DO; Kellen Hayes, MD; Allegheny Health Network

Introduction: The importance of surgical weight loss continues to rise in the setting of increased obesity prevalence. Laparoscopic sleeve gastrectomy (LSG) has prevailed as the most common weight loss procedure. The utilization of robotic surgical technology has increased due to improved visualization and dexterity, resulting in its application to bariatric procedures. Robotic sleeve gastrectomy (RSG) has therefore been explored as a potential alternative to LSG.

Methods: A single-institution review of all patients undergoing RSG or LSG from August 2019 through June 2021 was performed. Thirty-day leak rates, reoperations, and mortality were compared. Percent excess weight loss (%EWL) and change in BMI were compared at 1, 3, and 6 months. Data on patient weight was missing at equal rates for 0.5%, 21%, and 44% of patients at 1, 3, and 6 months, respectively. Normally distributed data were compared using the appropriate T-test; skewed data were compared using the Wilcoxon rank sum test.

Results: A total of 189 patients met inclusion criteria; including 87 RSG (46%) and 102 LSG (54%). Median patient age was 39 years (IQR 32–49) and 44 (IQR 34–52, p = 0.03) for RSG and LSG, respectively. Preoperative BMI was similar between RSG (median 45, IQR 40–49) and LSG (median 45, IQR 42–49, p = 0.31). There were no leaks in the RSG or LSG groups (0%). One patient required reoperation after LSG for drainage of an organ space abscess (1%). There were no mortalities. Percent EWL was greater for patients undergoing RSG versus LSG at 1 month, but similar at 3 and 6 months. Patients undergoing RSG had a greater decrease in BMI at all time points (Table).

Conclusion: With increased implementation of robotics in bariatric surgery, it is necessary to evaluate safety and feasibility. RSG demonstrates a safe and effective alternative to LSG, with similar perioperative outcomes and weight loss at 3 and 6 months. Future studies are necessary to analyze operative times and cost-effectiveness.

	%EWL; mean±SD			Change in BMI; median (IQR)		
Months	RSG	LSG	*p*	RSG	LSG	*p*
1	21.3±8.8	18.1±7.3	0.0065	-5.1(-6.1,-3.8)	-4.2(-5.2,-3.5)	0.0022
3	31.8±10.9	29.5±9.0	0.16	-7.4(-8.5,-6.4)	-6.9(-8.0,-5.4)	0.041
6	41.8±13.7	37.3±13.0	0.086	-9.5(-12.0,-8.1)	-8.4(-9.7,-7.0)	0.0089

P093

Video Based Assessment and Surgical Outcomes in Bariatric Surgery

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Introduction: The purpose of this study was to investigate the relationship between surgical skill as measured by Global Evaluative Assessment of Robotic Skills (GEARS) score and post-operative outcomes including excess weight loss (EWL) at 6 and 12 months, readmission, re-operation, and serious morbidities in patients undergoing Roux-en-Y gastric bypass (RYGB) and duodenal switch (DS).

Methods: Patients undergoing RYGB or DS within a single health system from January 2019 to January 2021 were prospectively captured. GEARS score is a validated Likert scale for evaluating technical skill. A third party of crowd-sourced evaluators assigned GEARS scores to each of these RYGB and DS cases. The variables underwent a univariate screen along with a multivariable linear regression, and the highest (1st) quartile performing GEARS scores were compared with the lowest (4th) quartile. Outcomes included EWL at 6 months, EWL at 12 months, OR time, estimated blood loss, readmission, reoperation, and serious (Clavien-Dindo 2) morbidity.

Results: Of 104 patients, serious morbidity occurred in 20 (19%), readmission in 12 (12%), re-operation in 9 (8.7%), ED visit within 30 days in 16 (15%), and ED visit in 31–90 days in 10 patients (9.6%). The highest quartile of GEARS score, compared with the lowest quartile, was associated with increased EWL at 12 months ($p = 0.02$) on unadjusted analysis. On multivariable regression, GEARS score predicted an increase in the dependent variable of EWL at 6 months ($p = 0.047$) when adjusted (for BMI, comorbidities, ASA), but not at 12 months ($p = 0.164$). Of note, 36% of patients (37/104) were lost to follow-up at 6 months, and an additional 30% (20/67) were lost to follow-up at 12 months.

Conclusions: In patients undergoing RYGB or DS, the highest quartile of GEARS score as a validated proxy for surgical skill was correlated with increased EWL at 6 months, suggesting that high level robotic skills might result in more weight loss post-operatively. While EWL at 12 months and major morbidity events were not found to be significant on multivariable regression, this is possibly due to loss to follow-up.

P094

Routine Pre-operative Esophagogastroduodenoscopy and its Effects on Bariatric Surgery Planning: a Single Institutions Experience

Katie Marrero, MD; Christian Perez, MD; Carle Foundation Hospital

Introduction: Bariatric surgery requires intensive patient workup and pre-surgical evaluation. Determining the appropriate bariatric surgery for each specific patient is dependent on a multitude of patient factors including BMI, history of GERD, esophagitis, and more. Additionally, the need for hiatal hernia repair at the time of bariatric surgery is important to know. However, the use of standard endoscopy pre-operative has been controversial, and the data is unclear of whether it is beneficial. Thus, the use of pre-operative EGD is highly variable per institution and surgeon. This study aims to examine the use of routine pre-operative EGDs at our institution and look at the findings these scopes provide and its impact on the surgical planning of our patients.

Methods/Procedures: Our institution performs routine pre-operative EGD on bariatric patients. We performed retrospective chart review to examine the findings of these EGDs and how they impacted our surgical planning in the past 2-year time frame.

Results: During our timeframe, we had 69 patients who underwent EGDs. Results are seen in Table 1.

Of the 69 patients, it was found that 43 of them had a change in their surgical plan based on the EGD findings (62.3%). This included 34 that needed a hiatal hernia repair that was previously not known, 1 paraesophageal that needed repaired, and 9 changed procedures from a sleeve gastrectomy to a RNY bypass. Additionally, 2 patients needed treatment for h.pylori prior to surgery based on biopsy results.

Additionally, 43 patients formally underwent a hiatal hernia repair. Of these, only 9 were noted on pre-operative upper GI studies while 46 patients were noted to have a hiatal hernia on EGD. Thus, 34 of the 43 repairs were noted solely on EGD (79%).

Conclusions: Our study shows that pre-operative EGD affects the surgical planning of a vast majority of patients. Additionally, EGD is the most effective means to diagnosing a hiatal hernia pre-operatively (as opposed to an UGI). This data shows the utility of pre-operative EGDs and that their use improves surgical planning.

Table 1 .

Diagnosis	# of patients with diagnosis	Percentage
esophagitis	16	23
gastritis	47	68
ulcer/polyp	11	15.9
H.Pylori	2	2.9
Duodenitis	2	2.9
Hiatal Hernia	46	66.7

P095

Does Being Identified as a "Red Flag" Patient Affect Post-operative Outcomes in Bariatric Surgery?

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Introduction: Bariatric surgery patients undergo a rigorous preoperative evaluation and workup by surgeons, dieticians, and mental health providers. Staff members may raise concerns about a patient regarding psychologic or behavioral reasons, designating them as "red flagged" (RF). This prompts additional discussion and evaluation amongst providers prior to surgery. We aim to examine the outcomes of these patients and to evaluate if certain RF are predictive of poor postsurgical results.

Methods: A study group was created of all RF patients at Sentara Comprehensive Weight Loss Solutions from 1/1/2013 to 2/18/2021. A control group of randomized patients over the same period was created. Exclusion criteria included age < 18 or > 89, never following up after initial consultation, or prior bariatric surgery. Data was gathered via retrospective chart review on preoperative characteristics, reasons for being a red flag patient, progression to operation, and post-operative outcomes. A total of 205 control patients and 224 RF patients were reviewed.

Results: RF patients were less likely to progress to surgery. However, of those patients who did undergo surgery, they were younger (44.06 vs 39.69, $p = 0.02$) and had a higher initial BMI (45.67 vs 49.89 $p < 0.01$) than the control group. There was no significant difference in preoperative weight loss between groups. RF patients took significantly longer (179 vs 259 days, $p < 0.01$) to progress to surgery from initial consultation. The control patients lost a significantly greater portion of their excess body weight (EBW) the first 6 months (RF 43.8% vs 49.4%, $p < 0.01$), though thereafter the two groups lost similar percentages of their EBW at 12 months (RF 52.0% vs 58.1%, $p = 0.064$), 24 months (RF 53.5% vs 49.9%, $p = 0.426$), and 36 months (RF 51.1% vs 51.3%, $p = 0.981$). There was no difference in the proportion of RF and control patients with regards to follow up visits. Subgroup analysis by reason for RF categorization did not demonstrate significant differences in outcomes.

Conclusions: RF patients were significantly less likely to progress to surgery. They had comparable long term EBW loss and follow up to control patients. However, there is less than 50% follow up more than one year post-operatively amongst all groups. This is likely the single largest confounder limiting conclusions about these groups. For those RF patients who progress to surgery, there is no evidence to suggest their outcomes will be worse, and we should continue to allow appropriate patients to progress to surgery.

P096

Assessing the Usefulness of Intraoperative Endoscopy in Laparoscopic Sleeve Gastrectomy

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Introduction: Staple line bleeding and leak are known early complications after sleeve gastrectomy, and both risk significant morbidity and mortality. Intraoperative endoscopy is often performed during sleeve gastrostomies to evaluate for staple line failure in real time. We aimed to establish the rate of endoscopic detection of staple line bleed or leak. Secondary outcomes were the impact of endoscopy on operative time, and the association between baseline patient characteristics and weight loss with endoscopy.

Methods and Procedures: An IRB-approved retrospective review of 516 patients who underwent sleeve gastrostomies between 2009–2020 was performed. Outcomes were collected. Demographic and clinical variables between LSG + endoscopy vs. LSG alone were compared using a Mann–Whitney U test for continuous variables and either Pearson's Chi-square or Fisher's Exact Test for categorical. Two-tailed p-value < 0.05 was considered significant. The rate of positive endoscopic findings was calculated.

Results: Of 516 patients, 57%(n = 295) had endoscopies. No leaks or bleeding were visualized intraoperatively. Four patients (0.78%) re-presented with leaks, and three patients (0.58%) experienced bleeding necessitating reoperation. All patients with complications had normal endoscopies. Endoscopy was associated with a statistically significant increase in mean operative time (< 0.0001).

Conclusion: While leaks and hemorrhages are known early complications, our experience is that these are not detected intraoperatively. Furthermore, endoscopy significantly increases mean operative time, and carries an independent risk of morbidity. Routine use should be left to the discretion of the surgeon but need not be considered an essential step of sleeve gastrectomy.

Variable	LSG + endoscopy	LSG alone	p-value
Age, years	40	39	
Sex, Female	243 (82.4%)	176 (79.6%)	
DM	84 (28.5%)	49 (22.2%)	
HTN	142 (48.1%)	98 (44.3%)	
OSA	91 (30.9%)	103 (46.6%)	0.0003
Smoker	77 (26.1%)	33 (14.9%)	0.0022
EBL, mL*	40	30	< 0.0001
Mean operative time, minutes	122	95	< 0.0001
Intra-operative leak	0	0	
Intra-operative bleed	1 (0.3%)	0 (0)	
Post-operative leak	4 (1.4%)	0 (0)	
Post-operative bleed	3 (1.0%)	0 (0)	
Change in BMI**	-12.8	-12.5	

*6 missing values
**114 LTFU and excluded

P097

The Robot vs. Bariatric Bleeds: New Technology Helps Improve Post-operative Bleeding Complications

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Objective: In the tide of robot-assisted minimally invasive surgery, few case reports of robot-assisted bariatric surgery exist in the literature. This study evaluates and compares the perioperative outcomes and risk factors for post-operative bleeding comparing robotic vs. laparoscopic-assisted bariatric surgery.

Methods: This study is a single-center retrospective review of all bariatric procedures performed for morbid obesity, both robotic, and laparoscopic approaches, between 2017 and 2020. Patient demographics, preoperative clinical data, surgical pathology, and perioperative outcomes were compared for differences between laparoscopic vs robotic approaches. Chi-square test was used to compare categorical variables. Student's t-test used for continuous variables as appropriate.

Results: Of 786 total patients that underwent robotic-assisted bariatric surgery, 6 of them had a complication related to bleeding in their post-operative course. Four of the index robotic cases required a return to OR for an unanticipated procedure. Of 618 total patients that underwent laparoscopic-assisted bariatric surgery, 31 had a complication related to bleeding in their post-operative course, 13 of which required a return to OR for an unanticipated procedure. There were no significant differences in patient characteristics between the groups. The robotic group had a shorter operative time ($P < 0.01$) and less estimated blood loss ($P = 0.02$).

Conclusions: Robotic bariatric surgery is a safe procedure and a reasonable alternative to laparoscopy. With meticulous technique, major bleeding can be avoided and most procedures can be completed robotically. Future studies are needed to elucidate any advantages of robotic stapler technology versus laparoscopic staplers.

P098

Clamp-Based Sleeve Gastrectomy Versus Bougie-Based Sleeve Gastrectomy: A Cost and Outcomes Comparison

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Introduction: Clamp-based Sleeve Gastrectomy (CSG) aims to standardize the technique of sleeve gastrectomy (SG). The single-patient-use laparoscopic stomach clamp (Standard Bariatrics, Cincinnati, OH) is 25 cm long and fits through a 12-mm trocar. In the CSG, a 20-French orogastric tube is used and the clamp is positioned approximately 6 cm from pylorus, 3 cm from incisura and 1 cm from the gastroesophageal junction to guide gastric sleeve creation. It is hypothesized that the CSG approach allows standardization of the SG to create a more uniform gastric sleeve. We aim to compare one-year outcomes and operative costs of CSG and 40-French Bougie-based SG (BSG) techniques.

Methods: A single-surgeon, retrospective consecutive cohort study was performed to compare SG patients over a 2-year period (N = 175; N = 90 BSG, N = 85 CSG) with 1-year follow-up. Continuous variables were assessed by Student's t-test and categorial variables by Chi-Square analysis. A $p < 0.05$ was considered statistically significant.

Results: Pre-operative Body Mass Index (BMI) of the BSG and CSG cohorts were similar (44.0 versus 41.4 kg/m^2 respectively). Operating time was greater in the CSG versus BSG group (64 min [range 60–74] versus 59 min [range 52–68]). The disposable clamp cost is $265, but the total operative supply cost was $180 less in the CSG group when compared to the BSG group ($1692 [1692–1692] versus $1872 [1706–2106], $p < 0.001$). This cost difference was likely due to CSG group requiring four staple loads with staple line reinforcement (SLR) while the BSG group required five. Thirty-day readmission rates were similar in BSG and CSG groups (2.2 vs 1.2%). Percent Excess Weight Loss (%EWL), Percent Total Weight Loss (%TWL) and change in BMI at 1 year was similar between the two cohorts, 47.5%, 19.0% and -8.30 kg/m^2 in BSG group versus 56.8%, 20.4% and -8.10 kg/m^2 in CSG group respectively.

Conclusions: CSG has similar outcomes to BSG for %EWL, %TWL and BMI change after 1 year with similar complication rates. While the operative time is longer in the CSG group, it is unlikely to be clinically relevant and there are significant cost savings using CSG due to a need for fewer staple loads.

P099

Endoscopic Predictors of Persistent GERD Following Conversion of Sleeve Gastrectomy to Roux-en-Y Gastric Bypass

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Background: Gastroesophageal reflux disease (GERD) is a relatively common consequence of sleeve gastrectomy (SG) with reported incidence up to 30%. Conversion to Roux-en-Y gastric bypass (RYGB) may be helpful, but GERD resolution is not seen in all patients.

Objective: To evaluate outcomes of SG to RYGB conversion for GERD and identify pre-revision endoscopic predictors of persistent symptoms.

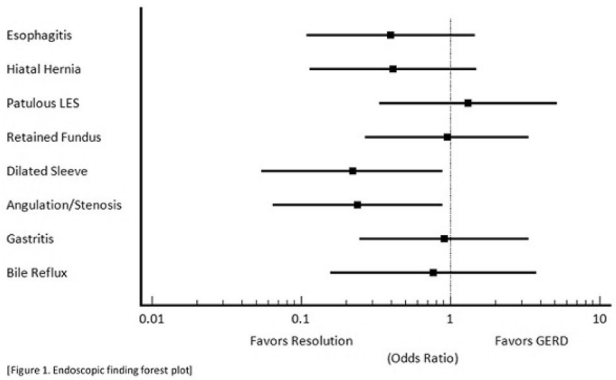
Methods: A chart review was performed of patients at our institution who underwent SG to RYGB conversion with GERD as an indication from 9/1/2013 to 9/1/2019. Pre-revision endoscopy reports were analyzed and significant findings were gathered. Clinic notes were reviewed and GERD symptoms and medications were recorded. The primary outcome was use of anti-reflux medication at two year or earlier final follow up. Odds Ratios (OR) with 95% Confidence Intervals (CI) were calculated for endoscopic findings to evaluate their relationship to the primary outcome.

Results: Forty-six patients underwent conversion from SG to RYGB with GERD as an indication. Average time from SG to conversion was 43 months. Average final follow up was 19 months. The mean body mass index at initial operation, conversion, and final follow up was 49.1, 38.3, and 33.8 kg/m2 respectively.

Resolution of GERD symptoms without anti-reflux medication was seen in 15 patients (33%). Resolution of symptoms with medication was seen in 19 patients (41%). Twelve patients had residual GERD symptoms despite anti-reflux medication (26%).

Sleeve dilation was seen in 16% of patients who remained on reflux medication and 47% of patients with medication free symptom resolution (OR = 0.22, 95% CI [0.05–0.89], p = 0.033). Sleeve angulation or stenosis was observed in 32% of patients who remained on medication and 67% of patients asymptomatic without medication (OR = 0.24, 95% CI [0.06–0.88], p = 0.032). A patulous lower esophageal sphincter (LES) was noted in 32% of patient who remained on GERD medication and 27% of patients with medication free symptom resolution (OR = 1.31, 95% CI [0.33–5.15], p = 0.70).

Conclusion: Conversion of sleeve gastrectomy to RYGB for the treatment of GERD is more effective for some individuals than others. In this study, patients with morphological sleeve irregularities such as dilation or angulation were significantly more likely to benefit from this procedure. While not statistically significant herein, a patulous LES may be a risk factor for persistent GERD following conversion.



[Figure 1. Endoscopic finding forest plot]

P100

Over 24 Years of Evolving Technical Experience and Clinical Results for Laparoscopic Roux-en-Y Gastric Bypass

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Techniques for laparoscopic Roux-en-Y gastric bypass vary in the creation of the jejuno-jejunostomy and the gastro-jejunostomy. Here we share the principles of the key steps in our long experience with this procedure and the evolution to its present-day form.

First, patient positioning involves supine position without the need for steep reverse Trendelenburg. In conjunction, subcostal port placements play a critical role for exposure, including one for liver retraction using a grasper holding the diaphragm from the subxiphoid port to give adequate exposure. In case of poor visualization due to size of the liver, mobilization of the left lateral segment of the liver allows work to be done anterior to it.

Second, starting with the creation of the jejuno-jejunostomy allows for freedom of movements and fluid creation of the anastomosis. Critical to this step is no division of the mesentery, to reduce risk of internal hernia. No stay sutures are needed. Common enterotomy is closed in a single layer hand-sewn anastomosis. Mesentery is closed with interrupted sutures with the inclusion of the "Brolin stitch" to prevent intussusception.

Third, the G-J anastomosis has evolved in the past 20 years, starting with the laparoscopic retrocolic retrogastric anastomosis with the EEA 21 mm with a short biliary limb in 1997. Between 2000–2001, the technique shifted to retrocolic retrogastric side-to-side anastomosis with the GIA and handsewn entero-enterostomy (with a longer biliary limb of 100 cm). Since 2004, the technique now involves antecolic antegastric single-layer handsewn anastomosis without any division of mesentery. Vagus nerve is left intact during dissection and pouch creation.

With 857 cases using this current technique, there has been 1 anastomotic leak, 1 leak from pouch due to infected hematoma, 1 internal hernia, 16 marginal ulcers (1.87%), 1 mortality, and 1 aborted case.

P101

Safety and Feasibility of Bariatric Surgery Without Inpatient Hospital Admission—A Prospective Study

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Background: Delays from the COVID-19 pandemic led to increased surgical wait times. Given mounting hospital bed pressures, maximizing bariatric surgical volumes while not compromising patient safety in the perioperative period remains a challenge for many healthcare systems. We prospectively evaluated the feasibility and safety of bariatric surgery without inpatient hospital admission.

Methods: We identified patients whose elective bariatric surgery we felt could be safely scheduled without inpatient admission to a surgical ward. Patients recovered in an "overnight stay" perioperative area. The remainder of their care was in accordance with our existing perioperative care protocols for bariatric surgery. Selection criteria excluded patients with revisional surgery, BMI $\geq$ 55, insulin-dependent diabetes, or therapeutic anticoagulation. Data were collected on consecutive patients scheduled without admission between April and June 2021. Seven- and 30-day emergency department (ED) visits and readmissions were used to establish the safety of this intervention. Outcomes were compared to a control group of an equal number of patients who underwent bariatric surgery with planned hospital admission per usual care immediately prior to the implementation of this protocol.

Results: Our intervention group consisted of 47 patients scheduled for surgery without admission: 42(89.4%) Roux-en-Y gastric bypasses and 5(10.6%) sleeve gastrectomies. Patients' length of stay was between 16 and 23 h, with a mean and median just over 20 h. Only 2(4.3%) patients required admission to the surgical ward, and both were discharged on post-operative day 1. Only 2(4.3%) patients had ED visits within 7-days postoperatively and 4(8.51%) patients had ED visits within 30-days of surgery; no patients required readmission. There were no complications, reoperations, or deaths. An equal number of bariatric surgery patients with planned hospital admission per usual care were analyzed for our control group. There were more 7-day ED visits in the control group when compared to the intervention group, but no difference in the 30-day ED visits (3[6.38%] and 4[8.51%] patients, respectively); no patients required readmission.

Conclusions: Our results demonstrate that performing bariatric surgery without inpatient hospital admission is effective and feasible in select patients without increased morbidity or use of post-discharge resources. Optimizing resource utilization is crucial now, as hospitals recover from the COVID-19 pandemic and prepare for potential future waves. Further research into the standardization of patient selection and Enhanced Recovery After Surgery protocols for the implementation of short-stay bariatric surgery is required.

P102

Incidental chyloperitoneum Associated with Internal Hernia in Patients Operated for Roux-en-Y Gastric Bypass; 5 Case Report and Review of the Literature

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Introduction: Chyloperitoneum (chylous ascites) is an extremely rare and underreported complication of Laparoscopic Roux-en-Y Gastric Bypass (LRYGB). Chylous ascites is the presence of a milky fluid, with a high fat content (triglycerides > 110 mg / dL), secondary to obstruction and leakage of lymphatic flow.

Methods and Procedures: We report 5 cases of laparoscopic Roux-en-Y gastrojejunal bypass (LRYGJB) operated patients who underwent reoperation due to suspicion of intestinal obstruction, and in whom chyloperitoneum was found as an intraoperative finding. Other causes of free fluid were ruled out during the operation; therefore, the diagnosis was associated with obstructive presentation in all patients, being resolved with the reduction of the hernia and correction of the mesenteric defect.

Results: Chyloperitoneum is a rare complication in patients with internal hernia with Roux-en-Y gastric bypass, with few cases reported in the literature. Acute presentation requires urgent surgical exploration. Laparoscopic or open examination is the most sensitive test for the diagnosis and treatment of an internal hernia; however, a CT scan of the abdomen can make the diagnosis in 85% of cases of internal hernia. The presence of the "mesenteric swirl" sign is the most relevant finding, being a strong predictor of internal hernia. As such, CT is often used as a less invasive modality to confirm the presence of an internal hernia prior to surgical exploration.

Conclusion: Although it is considered an uncommon complication, it can be an indicator of internal hernias when there is an inconclusive diagnosis and may well be resolved during diagnostic laparoscopy by reducing the internal hernia and closing the mesentery defect.

P103

Concomitant Cholecystectomy During Duodenal Switch: A Perioperative Risk Comparative Analysis of MBSAQIP Database (2015–2019)

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Background: The results of concurrent cholecystectomy with Roux-en Y gastric bypass and sleeve gastrectomy have been well elucidated. Large-scale data on the outcomes of concomitant cholecystectomy during biliopancreatic diversion with duodenal switch (BPD-DS) is still lacking. Our study aimed to explore whether simultaneous cholecystectomy with BPD-DS alters the 30-day postoperative outcomes.

Methods: We conducted a retrospective analysis of the MBSAQIP database between 2015–2019. Propensity-score matching (PSM) in BPD-DS with cholecystectomy (Group 1) and BPD-DS without cholecystectomy (Group 2) cohorts was performed (PSM ratio 1:2). The two groups were matched for a total of 24 baseline variables including age, gender, BMI, ASA class, and other medical comorbidities and conditions. The 30-day postoperative morbidity, mortality, reoperation, reintervention, and readmissions were obtained.

Results: Initially, 568 patients in Group 1 and 5079 in Group 2 were identified. After performing PSM, 564 and 1128 patients respectively were compared. The BPD-DS with cholecystectomy group reported a higher rate of reoperation and reintervention than BPD-DS alone (3.9% versus 2.4% and 3.2% versus 2%, respectively), even though it didn't reach statistical significance. The intervention time was significantly higher in Group 1 compared to Group 2 (192.4 ± 77.6 versus 126.4 ± 61.4 min). Clavien-Dindo complications (1–5) were similar between these two PSM cohorts.

Conclusion: Performing cholecystectomy at the time of BPD-DS significantly increases operative time. It also leads to a higher reoperation and reintervention rate without reaching statistical significance. The benefit of performing cholecystectomy has to be weighed with caution in these cases.

	All Cohort (Pre-Match)			Matched Cohort		
	Duodenal Switch	DS w/ Chole		Duodenal Switch	DS w/ Chole	
Clavien-Dindo Class	5079	568	p-value	1128	564	p-value
Grade 1						
Superficial Incisional SSI	24 (0.5%)	2 (0.4%)	1.0	7 (0.6%)	2 (0.4%)	0.726
Grade 2						
UTI	24 (0.5%)	3 (0.5%)	0.749	8 (0.7%)	3 (0.5%)	0.761
Pneumonia	19 (0.4%)	1 (0.2%)	0.714	3 (0.3%)	1 (0.2%)	1.0
Venous Thrombosis	17 (0.3%)	0 (0%)	0.405	3 (0.3%)	0 (0%)	0.555
Transfusion	32 (0.6%)	6 (1.1%)	0.270	3 (0.3%)	6 (1.1%)	0.068
Grade 3						
Deep Incisional SSI	3 (0.1%)	0 (0%)	1.0	0 (0%)	0 (0%)	1.0
Pulmonary Embolism	19 (0.4%)	1 (0.2%)	0.714	2 (0.2%)	0 (0%)	0.555
Grade 4a						
Acute Renal Failure	12 (0.2%)	1 (0.2%)	1.0	2 (0.2%)	1 (0.2%)	1.0
Myocardial Infarct	3 (0.1%)	0 (0%)	1.0	1 (0.1%)	0 (0%)	1.0
Progressive Renal Failure	8 (0.2%)	1 (0.2%)	1.0	2 (0.2%)	1 (0.2%)	1.0
Grade 4b						
Ventilator	11 (0.2%)	1 (0.2%)	1.0	1 (0.1%)	1 (0.2%)	1.0
Organ Space SSI	56 (1.1%)	10 (1.8%)	0.239	11 (1.0%)	9 (1.6%)	0.339
Sepsis	21 (0.4%)	5 (0.9%)	0.177	4 (0.4%)	5 (0.9%)	0.17
Septic Shock	16 (0.3%)	1 (0.2%)	1.0	0 (0%)	1 (0.2%)	0.333
Unplanned ICU Admissions	92 (1.8%)	7 (1.2%)	0.407	18 (1.6%)	6 (1.1%)	0.514
Grade 5						
Death	15 (0.3%)	0 (0%)	0.390	1 (0.1%)	0 (0%)	1.0
30-Day Outcome						
Readmissions	146 (2.9%)	33 (5.8%)	2.52E-4	67 (5.9%)	33 (5.9 %)	1.0
Reoperation	308 (6.1%)	22 (3.9%)	0.044	28 (2.4%)	22 (3.9%)	0.127
Reintervention	108 (2.1%)	18 (3.2%)	0.148	22 (2.0%)	18 (3.2%)	0.127
Operative Length (min.)	127.0 ± 68.0	198.5 ± 83.8	2.20E-16	126.4 ± 61.4	192.4 ± 77.6	0.000

Table: Clavien-Dindo complications and 30-Day Outcomes for pre- and post-matched Duodenal Switch without and with Laparoscopic Cholecystectomy procedures.

P104

Incidence of Adhesions in Patients Using Liraglutide Prior to Laparoscopic Sleeve Gastrectomy

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Objectives: The current study objectively identified incidence of adhesions between the stomach and pancreas in laparoscopic sleeve gastrectomy(LSG) patients on Liraglutide(cases group) and off(control group) Liraglutide. Evidence was obtained during the intraoperative period of cases showing posterior attachments between the stomach and pancreas.

Methods: The observational prospective study was conducted in the Department of General Surgery at Saudi German Hospital, Al-Aseer, Saudi Arabia. This study was approved by the Institutional Review Board at Saudi German Hospital (Al-Aseer, Saudi Arabia) and the need for informed consent was waived. The study was conducted in 218 patients presenting for Laparoscopic Sleeve Gastrectomies(LSG) with 117 patients with prior use of Liraglutide and 101 patients with no Liraglutide use, over a 12 month period from June 2020 to June 2021. Inclusion criteria included patients undergoing LSG with or without prior use of Liraglutide, normal upper GI scope prior to surgery. Exclusion criteria included patients with prior abdominal surgeries, bariatric surgery revisions, and other known causes of other causes of pancreatitis. Using laparoscopy obtained imaging during laparoscopic sleeve gastrectomy cases adhesions between the posterior stomach and pancreas were identified.

Results: Demographics included, the mean age of the patients in cases and control groups as 32.44 ± 9.90 years and 28.23 ± 8.48 years.($p = 0.001$). Mean weight of patients in cases and control groups was 108.7 ± 16.48 kg and 120.8 ± 20.80 kg respectively.($p < 0.001$) Mean height of patients in the cases and control groups was 156.98 ± 8.87 cm and 162.56 ± 9.00 cm respectively($p < 0.001$). Mean BMI of patients in the cases and control groups was 43.56 ± 4.59 and 45.00 ± 4.78 respectively($p = 0.024$). It was observed that under the cases group, 85% of the patients were females while 17.0% were males. Under the control group, 53.5% of the patients were females while 47.0% were males.($p < 0.001$). In the cases group 48.7% of patients had stopped Liraglutide for no obvious reason. Under the cases group, 77.8% of the patients had no adhesions while 22.2% had adhesions. Under the controls group, 100% of the patients had no adhesions.($p < 0.001$).

Conclusions: Our results for the first time demonstrate an incidence of adhesions in 22.2% patients undergoing LSG on prior Liraglutide intake. ($p < 0.001$)This study brings to light the possibility of adhesions in patients with prior exposure to Liraglutide undergoing LSG. Surgeons performing LSG in patients with prior exposure to Liraglutide should be cognizant of this possibility thereby requiring careful meticulous dissection.

P105

Minimizing Opioids After Bariatric Surgery: Initial Experience with the Bariatric Surgery Targeting Opioid Prescriptions (BSTOP) Initiative

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Introduction: In the setting of the current opioid epidemic, efforts to reduce unnecessary opioid use are important. Little is known about perioperative utilization of opioids in the bariatric surgical patient. The Bariatric Surgery Targeting Opioid Prescriptions (BSTOP) initiative of the American College of Surgeons aims to promote opioid prescribing reduction on a national scale using a multi-modal pain therapy and analyzing short-term narcotic use.

Methods: Consecutive adult patients undergoing primary bariatric procedures were prospectively observed for perioperative opioid usage patterns. Patients with preoperative opioid use or incomplete data were excluded from analysis. A consistent enhanced recovery protocol was applied to all patients, including the use of non-narcotics and narcotics in a step-wise manner. Opioid use was recorded in morphine milligram equivalents (MME). Patients were followed until 30 days postoperatively.

Results: Over the 11 month study period, 95 bariatric cases at Loyola University Medical Center were reviewed and 86 patients met inclusion criteria. All patients were treated with acetaminophen and gabapentin preoperatively. 77 (89.5%) patients received regional anesthesia intraoperatively using laparoscopic guided transversus abdominis plane (TAP) blocks. While all patients received scheduled non-opioid analgesics after the procedure, inpatient use of opioids varied widely (range 0–88 MME, median 15 [IQR 8–28.5]). Twelve patients required no opioids during their floor recovery. Post discharge, while nearly all patients were prescribed 10, 5 mg oxycodone tabs (75 MME), 28% did not use any opioids, 6% of patients required an additional refill, and 7% of patients reported ongoing opioid use at 30 days. At 30 days, median opioid use was 23 MME (IQR 0–60).

Conclusions: Using an intensive multimodal analgesic regimen focusing on non-narcotic analgesia, perioperative opioid use can be minimized. Opioid requirements after bariatric surgery can vary widely, however, most patients can be safely discharged with less than 75 MME (10, 5 mg oxycodone tabs) in addition to non-opioid analgesics. Future efforts may identify patient factors that explain over- or underutilization of perioperative opioids.

P106

Management and Predictors of Gastroesophageal Reflux Disease Following Laparoscopic Sleeve Gastrectomy

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Laparoscopic sleeve gastrectomy (LSG) is the most commonly performed bariatric procedure but has been linked with postoperative gastroesophageal reflux disease (GERD). This study examines pre-, intra-, and post-operative factors associated with GERD following LSG.

Under IRB approval, data on demographics, pertinent medical history, pre/post-procedure GERD status, intraoperative factors (e.g. hiatal hernia), as well as pre/postoperative upper gastrointestinal (UGI) series for 312 patients that underwent LSG at a tertiary medical center was collected. For patients with GERD post-LSG, additional data on post-procedure assessments and GERD management was collected.

Of the 286 patients with 6-month postoperative follow-up available, 34.3% reported GERD preoperatively—in this group, 35.5% continued to have GERD symptoms at follow-up. Of the patients without GERD preoperatively (57.4%), 13.4% developed GERD 6-months postoperatively. Overall GERD prevalence for the entire follow-up cohort was reduced from 37.4% (pre-LSG) to 28.7% (post-LSG). Pre-procedure UGI findings shared no correlation with GERD status at follow-up ($p = 0.51$). In contrast, smoking history increased the risk of GERD post-LSG by 69.6% ($p = 0.045$).

For select patients that received concomitant hiatal hernia (HH) repair with LSG, age, pre-procedure BMI and pre-procedural GERD status were promising predictors of intraoperative HH repair while pre-procedure UGI performance showed poor prognostic potential ($p > 0.05$). The rate of HH repair increased by 42% with every 10 years increase in patient age ($p = 0.032$) and moreover by 70% with every 5 unit increase in pre-procedure BMI ($p = 0.0305$). Patients with pre-procedure GERD were more likely to receive HH repair ($p = 0.0305$).

62.2% of patients with GERD post-LSG continued to report GERD at 1-year follow-up, but only 24.4% of these patients underwent post-procedure workups, including pH study, UGI and manometry. However, the degree of GERD symptoms in patients with GERD post-LSG, as quantified based on medications, corresponds to the post-procedure UGI findings ($p < 0.0100$).

This study demonstrated the capability and potential of using patient-based factors (age, pre-procedure BMI, and smoking history) as predictors for peri-procedural HH repair and GERD following LSG. Moreover, it showed that LSG was effective in reducing GERD challenging the current notion that LSG is refluxogenic. Pre-procedure UGI was an ineffective work-up for patient risk stratification with poor predictive value of HH repair or GERD post-LSG. Post-procedure work-ups are currently underutilized in bariatric surgery and hold promise in improving quality of outcome in LSG.

P107

The Impact of Bariatric Fellowship Training on Outcomes After Bariatric Surgery: An Analysis of the MBSAQIP

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Background: Differences between complication rates of bariatric surgeries performed by general surgeons versus those performed by fellowship trained bariatric surgeons are poorly understood. The objective of our study was to assess patient trends and outcomes across these two groups across elective gastric bypass and sleeve gastrectomy procedures.

Methods: We performed an analysis of the Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database of elective gastric bypass and sleeve gastrectomy procedures performed between 2016 and 2019. All patients who had a procedure performed by a fellowship trained metabolic and bariatric surgeon (MBS) or a general surgeon (GS) were included. Primary outcomes were to characterize the trends in bariatric delivery between general and metabolic surgeons from 2016 to 2019. Secondary outcomes included evaluating 30-day mortality and the incidence of serious postoperative complications.

Differences between groups were evaluated by chi-squared analysis for categorical data and ANOVA tests for continuous data. A non-parsimonious multivariable logistic regression was performed to determine the influence of subspecialized training on the incidence of serious complications and 30 day mortality.

Results: A total of 622,079 patients were analyzed, 15,485 were operated on by GS (2.5%, mean age 44.7 years, mean BMI 45.2 kg/m2, 80.3% female), while 606,594 procedures were performed by MBS (97.5%, mean age 44.4 years, mean BMI 45.2 kg/m2, 79.8% female). The average BMI and the proportion of female patients were similar across groups while a greater proportion of GS patients received gastric bypass (n = 5,741, 37.1% vs n = 153,472, 25.3%, $p < 0.001$) vs. MBS. The proportion of procedures being completed by the GS group decreased from n = 4,662, 3.2% in 2016 to n = 3,414, 2.1% in 2019. Overall, MBS patients had an increased number of comorbidities including hypertension (n = 286,682, 47.3% vs. n = 6,995, 45.2%, $p < 0.001$), COPD (n = 9,512, 1.6% vs n = 199, 1.3%, $p = 0.005$) and previous myocardial infarction (n = 7,471, 1.2% vs 141, 0.9%, $p < 0.001$). After adjusting for comorbidities, MBS patients did not have significant differences in death at 30 days (OR 1.26, [0.67–2.38], $p = 0.467$) or serious complications (OR 0.97, [0.89–1.06], $p = 0.554$).

Conclusions: The vast majority of bariatric procedures are being completed by fellowship trained surgeons with the proportion that is being completed by general surgeons decreasing. We found no difference in the recorded number of serious complications and 30 day mortality rates across the fellowship trained bariatric surgeon and general surgeon groups after adjusting for comorbidities.

P108

Fatal Sequelae of Reperfusion Injury in Post-operative Gastric Bypass

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We present the unique case of a 63 – year – old female who developed substantial venous thrombosis in the post – operative period following a laparoscopic hiatal hernia repair and Roux – en – Y gastric bypass. Venous thrombosis following surgery especially in the morbidly obese is a known possible complication, however we felt that this case required reporting due to the extreme extent of thrombosis and the significant course of events that occurred immediately following her readmission. Due to the increased thrombus burden following her gastric bypass procedure, our patient developed phlegmasia cerulea dolens and required operative thrombectomy. With restoration of blood flow following the procedure, our patient developed compartment syndrome of the thigh, requiring another return to the operating room for fasciotomies. However, her clinical status rapidly declined likely due to a significant reperfusion injury of an essentially cadaveric limb at that point. Ultimately she developed multisystem organ failure, which included the constellation of shock, hypoxic respiratory failure, acute renal failure, shock liver, and finally cardiopulmonary arrest on post—thrombectomy day one. As the bariatric surgery authors of this paper, we were especially inclined to report this particular case as the patient's clinical course was exceedingly complex due to her presenting phlegmasia cerulea dolens. Which was then further complicated post – operatively by the detrimental sequelae of massive reperfusion injury, ultimately leading to her death; after extensive PubMed literature review, this sequence of events following gastric bypass surgery has yet to be reported elsewhere.

P109

Risks of Adjustable Gastric Banding: Using MAUDE Data to Reveal Blind Spots in the Literature

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Introduction: At the turn of the century, there is ample literature to prove the durability of weight loss with bariatric surgery over medical management alone. Since the 1990s, laparoscopic adjustable gastric bands gained popularity due to their early weight loss with low rates of postoperative complications. Initial studies confirmed that LAGB was a safe bariatric procedure; but has been supplanted due to concerns of complications and efficacy. The purpose of this study is to examine the frequency of the different post-operative complications and device malfunction after LAGB leading to re-operation and deficiencies in reporting.

Methods and procedures: We performed a retrospective review of the Manufacturer and User Facility Device Experience (MAUDE) database, searching for all reported post-operative adverse events after LAGB from 2011 to 2021 that lead to re-operation. Our initial search included 3498 reported complications or malfunctions after LAGB. After excluding adverse events that were not clearly explained, we analyzed 3246 entries.

Results: The most frequently reported adverse events were "faulty device" which included fluid leak, and tubing or connection problems (N = 1720, 52.9%), followed by erosion (N = 279, 8.6%) followed by failure to lose weight (N = 180, 5.55%). Fourteen deaths (0.47%) were also reported. The literature had varying results for reasons of re-operation after failure of LAGB, including, (16% to 62% for failure to lose weight) (1)(2). Port tubing or band leak was 2.58% to 6.5% (3)(1). Band erosions were 0.9% to 3.9% in some studies (1)(3).

Conclusions: Although LABGs were introduced into the market as a relatively simple and safe intervention, over the last 10 years we found nearly 3500 reported adverse events ranging from regurgitation to death. Our data show that available literature could be underreporting these complications and suggest a benefit of patient and industry reporting as well. Future research should be done to determine the need for long term surveillance and early removal before severe complications occur.

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P110

Quantifying Physiologic Parameters of the Gastroesophageal Junction During Robotic Sleeve Gastrectomy and Identifying Predictors of Post-Sleeve Gastroesophageal Reflux Disease

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Introduction: Robotic sleeve gastrectomy (RSG) is among the most commonly-performed procedures for morbid obesity. However, patients occasionally develop post-operative gastroesophageal reflux disease (GERD) following RSG. Identifying patients most at-risk for this complication remains difficult. We aimed to correlate intraoperative physiologic measurements of the gastroesophageal junction (GEJ) during RSG in an attempt to identify predictors of post-operative GERD following RSG.

Methods: A retrospective review of a prospectively maintained database identified 28 patients in whom RSG was performed utilizing EndoFLIP technology between January and September 2021. Exclusion criteria included patients in whom a hiatal hernia was identified intraoperatively. Intraoperative GEJ measurements including cross-sectional area (CSA), distensibility index (DI), intra-balloon pressure, and high-pressure zone (HPZ length) were correlated with post-operative GERD-Health Related Quality of Life Questionnaire (GERD-HQRL) scores.

Results: Twenty-two of the 28 patients included were female (78.6) with a mean age of 38 ± 11 years and median body mass index (BMI) 43.1 (IQR 40.6–53.2) kg/m^2. GEJ CSA, pressure, and DI increased over the course of the surgery (CSA pre-op: 31 (IQR 19.5–39) mm2 vs. post-op: 67 (IQR 31.5–36.5) mm2, $p < 0.001$; pressure: 25.8 (IQR 20.8- 33.0) mmHg vs. 31.5 (IQR 29.1–36.5) mmHg, $p = 0.007$; DI 1.1 (IQR 0.8–1.8) mm2/mmHg vs. 2.0 (IQR 1.2–2.9) mm2/mmHg, $p = 0.022$), whereas HPZ length decreased (2.5 (IQR 2.5–3) cm vs. 2.0 (IQR 1.3–2.5) cm, $p < 0.001$).

Eighteen patients (64.2%) completed a GERD-HQRL questionnaire at a median of 3.9 (IQR 2.9–4.9) months post-operatively. Twelve (66.7%) reported a GERD-HQRL score of 0 before and after surgery; 4 (22.2%) reported a GERD-HQRL score of 0 pre-operatively and positive post-operatively; 2 (11.1%) reported positive scores pre- and post-operatively, both of which increased. Neither final GEJ CSA, pressure, DI, and HPZ length values nor percent change in aforementioned were correlated with a positive post-operative GERD-HQRL score; however, a larger decrease in HPZ length was correlated with a positive GERD-HQRL score (Spearman's rho = -0.602, $p = 0.008$; median difference in HPZ length GERD-HQRL 0: -1 (IQR -1.3- -0.5) cm vs. GERD-HQRL positive: -2 (IQR -2—-1.5) cm, $p = 0.036$.

Conclusions: An increase in GEJ CSA, pressure, and DI, and a decrease in GEJ length can be expected during RSG. Whereas no relation could be found between DI and a positive post-operative GERD-HQRL score, larger decreases in GEJ length during RSG were associated with positive scores and may be driver in the development of post-RSG GERD.

P111

Does use of the Standard Clamp® improve outcomes in patients undergoing laparoscopic sleeve gastrectomy?

Mohammad Hashim, MD; Michael McCormick, MD; Jacob Tatum, MD; Abby Hankins; Anjali Gresens, MD; Eastern Virginia Medical School

Introduction: The laparoscopic sleeve gastrectomy (SG) is the most common bariatric surgery currently performed. The Standard Clamp® (Standard Bariatrics, Inc.) is a surgical device that is designed to clamp the entire length of the stomach and serves as a guide during SG. The purpose of this device is to develop a standard, anatomy-based approach to make SG more consistent. By reducing variability and following more ideal anatomic parameters, we hypothesize that use of the Standard Clamp® will lead to better patient outcomes, namely related to reflux.

Methods: Retrospective chart review was performed on a sample of patients who underwent SG at our institution from 1/1/2013 to 2/18/2021. Data was collected including use of SC, pre-operative weight, excess body weight loss at 3, 6, 9,12, 18, 24, and 36 months, presence of reflux symptoms pre and post-operatively, post-operative anastomotic leak, and conversion to gastric bypass for uncontrolled reflux. A total of 118 SC and 75 control patients were reviewed.

Results: The patients in the SC and control groups were similar with respect to age, sex, and preoperative BMI. Presence of reflux both pre and post-operatively was not statistically significant between the two groups (Pre-operative: 51.7% in SC group vs 41.3% in NC group, $p = 0.16$; Post-operative: 35.6% in SC group vs 38.7% in NC group, $p = 0.67$). 12/57 (21.1%) patients without preoperative reflux developed de novo reflux postoperatively compared with 10/44 (22.7%) in the NC group ($p = 0.84$). There was a trend to resolution of reflux post-operatively in the SC group compared to the NC group, though this was not statistically significant (31/61 (50.8%) vs 12/19 (38.7%), $p = 0.27$). No anastomotic leak was reported in either group. Two patients in the control group required revision to gastric bypass for post-operative reflux while none in the SC group did. There was no statistically significant difference in post-operative weight loss out to two years post-operatively. Difference of excess body weight loss at 36 months did show statistical significance in favor of the SC group, but this is limited by poor follow-up among our cohort.

Conclusion: Our study suggests that the use of the Standard Clamp® in SG results is non-inferior to standard techniques. There is a trend towards improved post-operative reflux in the SC group. A greater sample size will be necessary to draw definitive conclusions.

P112

The Effect of Pre-operative Patient Factors on Post-Operative Weight Loss in Bariatric Surgery

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Introduction: Bariatric surgery has been an evolving field over the last several decades. The goal of these operations is to achieve profound and sustainable weight loss for morbidly obese patients. While bariatric procedures are known to be effective, appropriate patient selection remains elusive. Here we examine several pre-operative patient characteristics in their effect on post-operative weight loss.

Methods: A retrospective survey of patients from Sentara Comprehensive Weight Loss Solutions was conducted from 1/1/2013 to 2/18/2021. Patients less than eighteen or over eighty-nine at initial consultation, those that did not follow up after initial consultation and those that did not manage to proceed to surgery were excluded. A total of 251 patients who successfully completed their operation and were seen in at least one follow-up visit were identified. Our cohort was then stratified by age at operation, preoperative weight loss, and BMI at time of operation. Post-operative weight loss was determined for up to 36 months reported as percent excess body weight loss as calculated by the Devine formula. Analysis of variance models were then used to compare differences within the various groupings.

Results: The primary variable under review was weight loss at the defined intervals post-operatively. When our cohort was stratified by age groups, younger patients were found to achieve higher levels of weight loss at all follow up time periods (3 months $p = 0.01$, 12 months $p = 0.01$). Greater pre-operative weight loss did trend toward more absolute weight loss after surgery, but the trend did not sustain when accounting for percent of expected weight loss (3 months $p = 0.83$, $p = 0.34$). Those with higher BMIs at surgery were found to lose more weight (3 months $p = < 0.01$, 12 months $p = < 0.01$). However, lower BMI patients lost greater percentages toward their ideal body weight goal overall (3 months $p = < 0.01$, 12 months $p = < 0.01$). Regardless of variable, time from consultation to operation did not differ ($p = 0.39$, 0.32 and 0.66 respectively).

Conclusions: Younger patients and those patients starting at lower BMIs tended to lose a greater proportion of their excess weight. Even though losing weight before surgery was not associated with greater weight loss, it holds that a lower starting BMI is favorable. Indeed, our study suggests that bariatric procedures are more effective the earlier they are performed, and targeted efforts should be made to encourage patients to achieve as much weight loss as possible before their operation.

P113

The Benefit of Different Techniques in Long-Term Outcomes After Paraesophageal Hernia Repair

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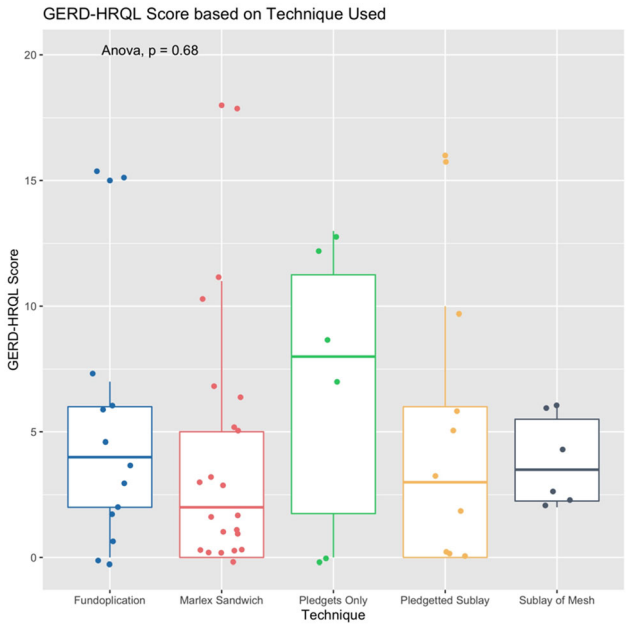
Introduction: The objective of this study is to examine the impact of different surgical techniques on revision rates and long-term patient reported outcomes following the standard of care, laparoscopic paraesophageal hernia repair (LPEHR). Variations in technique exist that may impact outcomes including technique for crural apposition, mesh reinforcement, addition of partial/complete fundoplication, and use of gastropexy. The relationship between operative techniques and outcomes remains unclear.

Methods: We assessed individuals undergoing LPEHR retrospectively, constructing a database including demographics, operative information, and revision surgeries. We assessed long-term patient reported outcomes using the GERD-HRQL score.

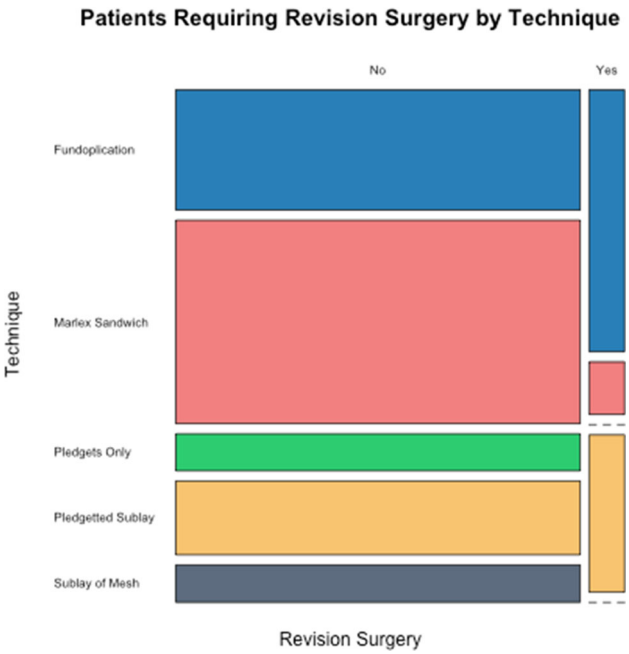
Results: 111 consecutive subjects underwent an LPEHR. 9 of these subjects had a later revisional surgery, excluding them from sub-analysis with the GERD-HRQL questionnaire. The use of different techniques were compared to revision rates and overall GERD-HRQL scores. Statistical analyses were performed using ANOVA and the Pearson's $\chi 2$ test.

Technique	Description
Marlex Sandwich	Use of a nonabsorbable, synthetic mesh placed between the crura with optional use of mesh sublay reinforcement, fundoplication, gastropexy, and pledgets
Pledgetted Sublay	Use of a mesh reinforcement sublay where crural approximation sutures incorporated the mesh; optional use of fundoplication and gastropexy
Unsecured Sublay	Use of an unsecured mesh reinforcement sublay; optional use of fundoplication and gastropexy
Pledgets Only	Use of pledgets only without marlex or a mesh reinforcement; optional use of fundoplication and gastropexy
Fundoplication	Fundoplication with optional use of gastropexy only (no mesh or pledget reinforcement)

The mean follow up time was 2.97 years (SD = 0.61 years). 55 subjects completed the GERD-HRQL questionnaire and had available data on technique for analysis.



The ANOVA test demonstrates that there is no significant difference between technique used and GERD-HRQL score (p-value = 0.68).



The Pearson's $\chi 2$ test demonstrates that there is no significant difference between technique used and revision surgery (p-value = 0.10).

Conclusion: Technique used during repair of a paraesophageal hernia does not seem to have significant impact on the GERD-HRQL score. A trend towards higher rate of revision was noted for fundoplication alone and for pledgetted sublay, but this was not significant. The findings are limited by small sample size and possibility of selection bias due to the retrospective nature; however, this provides a framework to continue assessing the impact of variations in technique on outcomes in LPEHR.

P115

Control of Reflux Symptoms in Post-Operative Bariatric Patients Following Hiatal Hernia Repair

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Background: Gastroesophageal reflux is a widespread problem commonly seen after bariatric surgery. Hiatal Hernia is one of the anatomic causes of reflux. Hernia repair is traditionally followed by gastric fundoplication but with the fundus removed as part of the bariatric surgery, fundoplication is not possible. Currently a paucity of data exists analyzing the efficacy of hiatal hernia repair to manage reflux in post-surgical bariatric patients.

Objective: To compare clinical outcomes of hiatal hernia repair for GERD symptoms in patients who have had laparoscopic gastric bypass (LRGBY) or laparoscopic sleeve gastrectomy (LGS).

Methods: This was a single institution, single surgeon retrospective case series. Patients were selected for chart review based on procedural codes to include laparoscopic hiatal hernia repair following either LGS or LRGBY. Hiatal hernia repair was conducted to treat GERD in patients based on EGD findings and pH probe study. Statistical analysis was conducted focusing on differences in peri-operative demographics and symptomatic outcomes.

Results: 19 patients were included. 14 patients underwent LGS and 5 patients underwent LRGBY. Patient demographics and pre-operative symptoms are detailed in the Table 1. Mean BMI and age was slightly higher in LRGBY patients compared to LSG patients; this was not statistically significant. 100% of LSG patients presented with de novo hiatal hernias. Within the LRGBY group, 60% patients had de novo hernia. Two patients had recurrent hernia with one undergoing conversion to LRGBY after prior LSG. 80% of LRGBY patients and 53% of SGB had resolution of GERD symptoms (p = 0.257, NS).

Conclusions: Our data suggests a trend of LSG patients having a higher incidence of pre-operative GERD symptoms while LRGBY patients had a higher incidence of pre-operative obstructive symptoms. There is also a trend towards better symptomatic control of GERD following hiatal hernia repair in LRGBY compared to LSG, however this was not statistically significant. While some trends begin to emerge in the data, this study chiefly serves to emphasize the need for further research into the difference in long term outcomes following bariatric surgery independent of weight loss and nutritional analysis. More thorough and complete research into the symptomatic control of these patients would require uniform symptom scale measurement and prospective analysis.

Table 1 .

	Female	Male	Age (SD)	BMI (SD)	Pre-operative GERD Symptoms	Pre-operative Obstructive Symptoms
LSG	13	1	52 (14.8)	32 (5.4)	11 (78%)	7 (50%)
LRGBY	5	0	58 (8.7)	35.6 (7.9)	4 (80%)	3 (60%)

P116

Effect of Gastrojejunal Stenosis on Weight Loss in Roux-en-Y Gastric Bypass Patients

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Background: Gastrojejunal (GJ) stenosis remains a relatively prevalent complication after Roux-en-Y gastric bypass (RYGB), with an incidence of 5–7%. While several interventions can treat GJ stenosis, its effect on weight loss outcomes is unknown. We aim to compare the weight loss in RYGB patients with and without gastrojejunal stenosis.

Methods: We analyzed patients who underwent RYGB between 2008 and 2020 and developed gastrojejunal stenosis in this retrospective study. We implemented a 1:4 case-match analysis for the following variables: age, gender, BMI, and diabetes (DM II) status. Percent total body weight loss (%TWL) was measured at 3 months, 6 months, 1 year, 2 years, 3–5 years, and 5–10 years. Data were analyzed using T-test and Wilcoxon-Mann–Whitney.

Results: We identified 30 cases and matched 120 controls. There was no statistical significance between age, gender, BMI, and DM II status between both groups. The GJ stenosis characteristics and interventions are summarized in Table 1. The %TWL in the GJ stenosis group were 18.4%, 26.9%, 32.2%, 30.4%, 29.7%, 32.4% at 3 months, 6 months, 1 year, 2 years, 3–5 years and 5–10 years compared to 17.4%, 24.0%, 30.4%, 28.5%, 23.2 and 20.4% in the control group (Fig. 1). Although the GJ stenosis group lost more weight at each time interval, there was no statistical significance in %TWL between the case and control group at any of these time intervals.

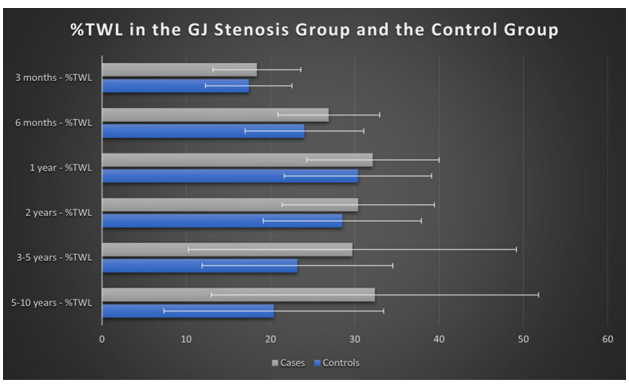
Conclusions: GJ stenosis does not affect short or long-term weight loss outcomes in RYGB patients.

Supplemental Material:

Figure 1

Table 1 Gastrojejunal Stricture Characteristics and Interventions

Factor N	Overall 30
Mean anastomotic stricture size (SD)	9.13 (± 2.3)
Stricture sizes	
Mild	7 (23.3%)
Moderate	14 (46.6%)
Severe	9 (30.0%)
Number of endoscopic interventions	
1	30 (100%)
2	9 (30%)
3	1 (3.3%)
Therapeutic used	
Dilation with anastomotic balloon	22 (73.3%)
Dilation with metallic stent placement	4 (13.3%)
Dilation with only the endoscope	3 (10%)
Revisional surgery after failed dilation	1 (3.3%)



P117

Perceptions of Bariatric Surgery Among Primary Care Physicians in Northern Israel

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Background: Morbid obesity is defined by the World Health Organization (WHO) as the epidemic of the twenty first century. Obesity is a chronic metabolic disease with global distribution among adults and children that affects the quality of life and the daily functioning. Furthermore, it increases the incidence of serious comorbidities, such as diabetes mellitus, hypertension, sleep apnea and others. Family physicians are key players in the treatment of morbid obesity, thus a better understanding of the disease and its treatment options can increase patients' referral rates to the various treatment modalities, including bariatric surgery.

Objectives: Our study evaluates the level of knowledge and the management of morbid obesity among family physicians in northern Israel.

Methods: This is a quantitative cross-sectional study using a self-report questionnaire among family physicians in community clinics in the northern district of Israel. The questionnaire distributed to physicians was a quantitative questionnaire that examined perceptions, attitudes and approaches to managing morbid obesity among family physicians. The questionnaire consists of two parts: the first part includes demographic information, and the second part deals with the management of obesity treatment, including physician knowledge and attitudes toward bariatric surgery.

Results: 246 family physicians completed the questionnaire, with a response rate of 57.2%. The average age was 46.4 years, 74% were men, and the majority (55.6%) of the participants was Muslim-Arabs. A large percentage (46.12%) of the respondents had over 15 years seniority in family medicine. 26.2% of the participants in the study completed their medical studies in Israel. In this study, there was no statistically significant relationship between the socio-demographic and professional characteristics of family physicians and their management of morbid obesity. Young doctors with 6–10 years of experience and doctors who studied medicine in Israel were more knowledgeable about obesity. Doctors with high volume clinics tend to refer less patients to bariatric surgery, and those with seniority less than 10 years tend to refer more patients to bariatric surgery. Physicians with more positive attitudes toward bariatric surgery prone to agree more with the Americans Family Physicians guidelines for the management of morbid obesity.

Conclusion: Conducting workshops and annual training courses on the treatment of morbid obesity will increase the level of knowledge and awareness and will increase the percentage of patients referral for bariatric surgery, especially in older family physicians with high seniority.

P118

Patient Satisfaction in Employer-Direct Bariatric Surgery Destination Program

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Introduction: This study aimed to evaluated patient satisfaction in a collaborative destination bariatric program. This program was developed between a bariatric surgery program and large employer, which were separated by over 1,100 miles. The program's partnership with the employer endeavors to improve the long-term health of the employer's members by offering bariatric surgery candidates a high-value, comprehensive, episodic bundle for treatment. The program's integrated approach to bariatric surgery offers patients personalized care from nurse navigators, dietitians, behavioral health providers, hospitalists, and surgical specialists throughout the entire surgical experience, extending from the pre-operative to the post-operative period. Patients travel to the program for an initial in-person visit with the multidisciplinary team and return weeks later to have their surgery completed. This innovative and unique program involved the use of a messaging application to collect pre-operative and post-operative survey data from patients. Collected data allowed the program to make immediate improvements and assess changes to the program, especially those occurring during the COVID-19 pandemic.

Methods: A retrospective review of the destination program's patient surveys has been undertaken to assess patient satisfaction scores in multiple metrics. The results of this patient satisfaction study provided baseline quality indicators for the program. Metrics involving the hotel accommodations and nutrition classes transition from in-person to virtual platforms were analyzed to evaluated interventions made to the program design and protocol.

Results: Patient satisfaction surveys were collected from 125 patients representing 77% and 90% of the pre-operative and post-operative returned surveys, respectively, from April 2019 through June 2021. The survey yielded high patient satisfaction scores (greater than 4.7 out of 5) in overall experience and with many aspects of our multidisciplinary team. Early in the program's launch, a lower score was consistently found in relation to hotel accommodations. However, after interventions to the patients' hotel accommodations a significant ($p = 0.0004$) improvement was seen. Changes to the patient education platform from in-person to virtual in response to the COVID-19 pandemic, and its relationship to patient satisfaction were also analyzed and found to have no impact ($p = 0.52$) in patient satisfaction.

Conclusion: With the development and implementation of a bariatric destination program came unique challenges. Using a patient-friendly messaging app allowed both pre- and post-operative surveys to be completed, reviewed, and analyzed on a regular basis. We found that overall, patients were generally satisfied with the novel program. Interventions to improve or adapt the program were successful.

P119

A Robotic-Assisted Approach may Reduce Risk of Venous Thromboembolism After Minimally Invasive Bariatric Surgery

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Introduction: Severe obesity is a risk factor for venous thromboembolism (VTE). While minimally invasive techniques reduce the risk of VTE in comparison to open surgical approach, few studies have compared rates of VTE between robotic bariatric surgery and conventional laparoscopy. In this study, we study the impact of the robotic-assisted technique on postoperative VTE.

Methods: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) Data Registry was queried from 2015–2018 for adult patients who underwent primary laparoscopic sleeve gastrectomy (LSG) or Roux-en-Y gastric bypass (LRYGB). Exclusion criteria included: revisional procedure, open surgery, lost to follow-up, BMI < 35 kg/m^2, or records with missing data. Patients were stratified into robotic-assisted and conventional laparoscopy surgery groups. Perioperative factors and 30-day postoperative outcomes were assessed and multivariate analysis was performed. The primary endpoints were to compare rates of deep venous thrombosis (DVT), pulmonary embolism (PE) and determine the VTE risk with robotic-assisted surgery in relation to conventional laparoscopy.

Results: Of 760,076 patients studied, 504,342 patients met inclusion criteria. 41,462 patients underwent robotic-assisted surgery and 462,880 underwent conventional laparoscopy. Postoperative VTE affected 2,380 of 465,800 (0.514%) patients who underwent laparoscopic bariatric surgery and 207 of 41,462 (0.499%) patients who underwent robotic surgery ($P = 0.684$). After multiple logistic regression analysis controlling for preoperative factors, if patients underwent robotic-assisted bariatric surgery instead of conventional laparoscopy, the likelihood of developing VTE was 13.8% lower (OR 0.862, 95% CI 0.746–0.996).

Conclusion: The decision to use a laparoscopic or robotic-assisted surgical approach must be determined on a case-by-case basis. This study suggests that the use of robotic-assisted bariatric surgery may decrease the likelihood of developing VTE in patients undergoing primary bariatric surgery.

P120

Comfort with and Educational Needs of General Surgeons Managing Complications After Bariatric Surgery: A Survey Of Surgeons In Ontario, Canada

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Introduction: Approximately 5% of patients will develop postoperative complications after bariatric surgery. These patients often present to their local general surgeons, rather than travelling back to the hospital where their primary bariatric operation was performed. The objective of this study was to conduct a survey of practicing general surgeons in Ontario, Canada to explore their level of comfort, educational needs and preferences regarding management of patients with surgical complications post-bariatric surgery.

Methods and Procedures: A 40 item survey was created and piloted with community and academic general surgeons. It was disseminated by mail to all general surgeons in Ontario in August 2020. Bariatric surgeons and general surgeons who do not participate in acute care surgery call were excluded from participating.

Results: A total of 137 out of 715 (19.2%) eligible surgeons completed the survey. Of the respondents, 11/107 (10.3%) had MIS/bariatric fellowship training and 49/112 (43.8%) had exposure to bariatric surgery during residency or fellowship. 72/108 (66.7%) respondents agreed that management of complications after bariatric surgery should be within the skillset of a general surgeon; however, 28/108 (25.9%) were not confident managing these complications. 71/108 (65.7%) respondents were interested in additional continuing professional development (CPD) resources regarding management of these complications. The top 3 motivations for seeking additional CPD resources on this topic were interest, CPD credits and improving patient care. The top 3 barriers were lack of interest, inconvenient location and excessive cost. Hands-on workshops, online resources and live webinars were the most preferred educational formats for future CPD resources on this topic; with 67.1% of participants willing to commit 1–3 h and 42.9% willing to pay $>$ \$100 for such CPD resources.

Conclusion(s): One quarter of practicing general surgeons in Ontario, Canada, who responded to this survey, are not comfortable managing patients with complications after bariatric surgery; however, the majority of surgeons are interested in additional CPD resources on this topic. Hand-on workshops, online resources and live webinars are the most preferred formats for future CPD resources.

P121

Risk Factors for Early Biliary Complaints Following Elective Bariatric Surgery: An MBSAQIP Analysis and Scoping Review

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Introduction: Bariatric surgery patients are at increased risk of postoperative biliary complications, a clinical spectrum of disease which are currently poorly understood and difficult to manage. This study aims to characterize patients experiencing early post-operative biliary complications and to determine risk factors associated with its occurrence.

Methods and Procedures: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database was analyzed and two cohorts were outlined for comparison, those who experienced early biliary complications (within 30 days of bariatric surgery) and those who did not. Bivariate analysis using chi-squared for categorical data and ANOVA for continuous data was performed to determine between group differences. Multivariable logistic regression analysis was performed to determine factors independently associated with early biliary complications following bariatric surgery.

Results: We evaluated 750,498 patients with 691 (0.1%) having early post-operative biliary complications. Patients who experience early-post operative biliary complications are younger (40.1 $\pm$ 11.9 vs 44.5 $\pm$ 12.0 years, $p < 0.001$) and more often female (87.7% vs 79.6%, $p < 0.001$) compared to others. Although uncommon, patients with biliary complications require significantly more reoperations (86.0% vs 1.1%, $p < 0.001$), readmissions (82.5% vs 3.6%, $p < 0.001$), and interventions (15.8% vs 1.2%, $p < 0.001$) in the first 30 days after surgery. Undergoing LRYGB (OR 1.76, CI 1.46–2.11, $p < 0.001$), female sex (OR 1.58, CI 1.25–2.01, $p < 0.001$), and hypertension (OR 1.21, CI 1.01–1.44, $p = 0.037$) were the only independent risk factors predictive of early biliary complications, while non-Caucasian ethnicity appears to be protective (OR 0.68, CI 0.51–0.90, $p = 0.008$).

Conclusions: Female patients, non-Caucasians, and those undergoing LRYGB appear to be at greatest risk for early post-operative biliary complications. Evaluation of preventative measures or prophylactic cholecystectomy during bariatric surgery in these high-risk groups is needed.

P122

Continuous Respiratory Surveillance with Capnography and Oximetry After Bariatric Surgery

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Introduction: PRODIGY, a predictive patient score to evaluate the risk of post-operative respiratory complications, has been recently proposed from a large multicenter study evaluating a variety of surgical procedures (1). Use of this score resulted in better patient outcomes and reduced hospital costs and length of stay. We applied this score to a cohort of bariatric surgery patients and collected postoperative continuous monitoring to measure respiratory complications.

Methods: As part of this IRB approved study, continuous surveillance for respiratory complications was performed perioperatively (PACU and on the ward) after robotic bariatric surgery using capnography and peripheral oximetry (Capnostream 35, Medtronic Inc.). Preoperative workup included sleep studies, weight optimization, and evaluation of risk for opioid-induced respiratory depression (low, intermediate or high, using PRODIGY scoring). All patients received multimodal intra operative no-opioid anesthesia and postoperative low-opioid analgesia. Respiratory complications were measured using the five standard published categories (1) by ex-vivo analysis of the respiratory traces, completed by blinded observers.

Results: Of the 29 patients evaluated (7 male), 20 patients had obstructive sleep apnea with CPAP use (OSA) and 9 patients did not (Control). Average duration of observation was 141 min. We encountered 44 respiratory depression events across the 29 patients. The most frequent respiratory event recorded was a transient desaturation below 85%, which usually lasted 20–30 s and resolved spontaneously in 3 to 5 min. Most episodes followed IV opioid analgesia administration during recovery. All episodes resolved without nursing or medical action. Respiratory events occurred more frequently in patients with OSA (1.65 per patient versus 1 per patient in controls). This difference did not reach significance ($p = 0.21$ by t-test). A linear regression of the number of events by PRODIGY score adjusted by OSA status did not show a significant trend ($p = 0.94$).

Conclusion: The predictive value of the PRODIGY score on this small group of bariatric patients was not robust: still, OSA patients had an increasing frequency of postoperative events. Patients with intermediate or high risk score showed a non-significant trend to more frequent respiratory complications, compared to low-risk patients. We attribute the results to opioid-free anesthesia, early CPAP utilization on admission to PACU and light postoperative narcotic requirements.

(Supported in part by an Equipment Grant from Medtronic Inc. to Dr Camporesi).

Reference

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P123

Early Discharge After Bariatric Surgery: An Analysis of the Adoption, Implementation, and Safety Amongst Accredited MBSAQIP Centers

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Introduction: Early recovery after surgery (ERAS) protocols outline strategies to optimize the patient preoperatively, reduce recovery time and post-operative pain. Our study examines trends in length of hospital stay as a surrogate of ERAS adoption following elective bariatric surgery and trends in post-operative complications between 2015 and 2019.

Methods and Procedures: The Metabolic and Bariatric Surgery Accreditation and Quality Improvement Program (MBSAQIP) database was used to compile patients who underwent Roux-en-Y gastric bypass or sleeve gastrectomy between 2015 and 2019. Patients we categorized into either early discharge ($\leq$ 2 days) or late discharge (3-7 days). Patient and non-patient factors were compared between the two groups, and a multivariable logistic regression was carried out to determine predictive factors for early discharge.

Results: A total of 748,955 patients underwent SG and RYGB between 2015 and 2019. Based on our criteria, 399,918 (53%) patients were discharged early. Patients discharged early were younger, were less likely to be smokers and had fewer comorbidities in all measured domains. The rate of discharge within one day increased between 2015 and 2019 (42.1% in 2015 vs 62.0% in 2019, $p < 0.0001$), however, the rates of all measured complications decreased or were unchanged between 2015 and 2019. Multivariable analysis revealed lower ASA classification (OR 1.07; CI 1.06 -1.09; $p< 0.0001$) and operative year (2019 vs. 2015 OR 2.26; CI 2.22-2.29; $p< 0.0001$) as predictors of early discharge, with operative year 2019 shown to be the single greatest independent predictor of early discharge.

Conclusions: There is a general trend in bariatric surgery towards the practice of discharge within one day of surgery, suggestive increased adoption of ERAS in bariatric surgery. Further work is needed to establish safe and effective ERAS protocols for bariatric patients, as well as a set of criteria to determine which patients are eligible for this practice.

P125

Bariatric Surgery is Associated with Decreased NASH Clinical Risk Scores among Young Adults

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Background: Morbid obesity is a contributing factor for Non-alcoholic steatohepatitis (NASH), with a prevalence of 20-30%, this is a leading cause of liver cirrhosis. The NASH clinical risk score (NASHCRS) is a validated scoring system used to identify patients with morbid obesity who are at increased risk of steatohepatitis. The NASHCRS uses six predictive factors: hypertension, type 2 diabetes, sleep apnea, AST, ALT, and non-Black race.

Methods: From our prospectively maintained database, we retrospectively identified 100 patients between 15-27 years old who underwent sleeve gastrectomy or gastric bypass between 2015 and 2018. We calculated and compared the preoperative NASHCRS to their postoperative scores at 6, 12, 24, and 36 months after their bariatric surgery.

Results: We analyzed 100 patients who underwent either a sleeve gastrectomy or a gastric bypass surgery with a mean age of 23.5 years (15-27), a pre-operative BMI of 44.6 kg/m2 (24.5-64), and pre-operative NASHCRS of 2.3 (0-6). Our results showed that 57 patients had a mean score of 2.19 (0-5) at 6 months follow up (p=0.33), 39 patients had a mean score of 2.02 (0-5) at 12 months (p=0.15), 27 patients had a mean score of 1.74 (0-4) at 24 months (p=0.03) whereas 25 patients had a mean score of 1.6 (0-4) at 36 months follow up (p=0,01).

Conclusion: Obese young adults at risk for steatohepatitis show a reduction in their NASHCRS as early as 6 months following bariatric surgery. This reduction in their NASHCRS improved over their 36 months postoperative time with a statistically significant difference 24 months post-intervention.

P126

Endoscopic Stenting for Gastrojejunostomy Leak Status Post Robotic One Anastomosis Gastric Bypass

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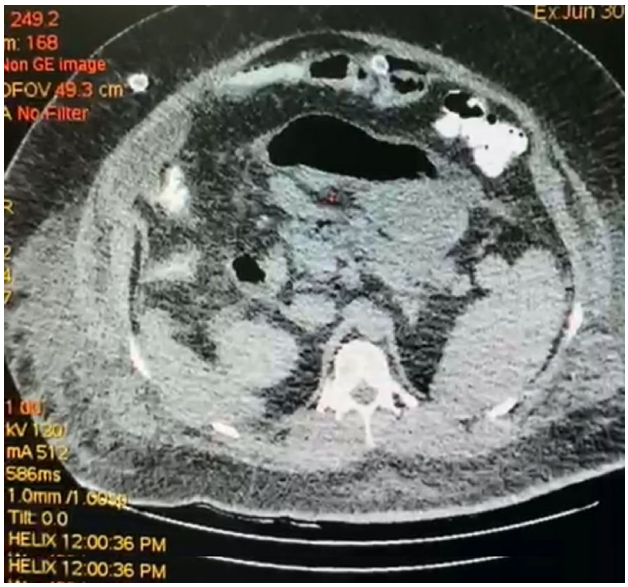
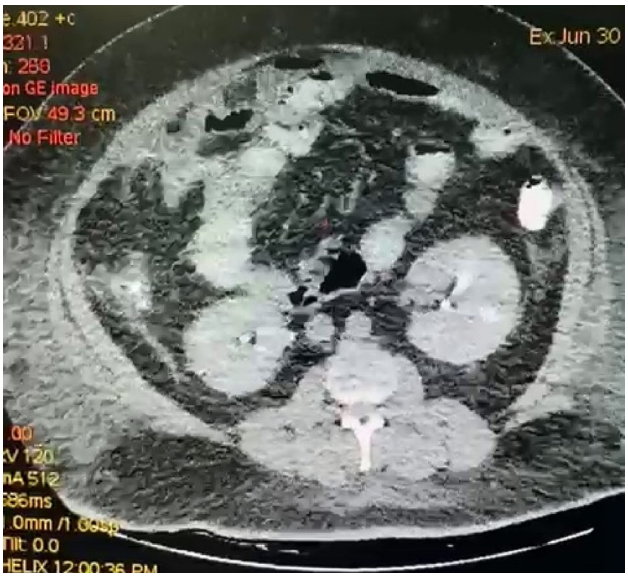
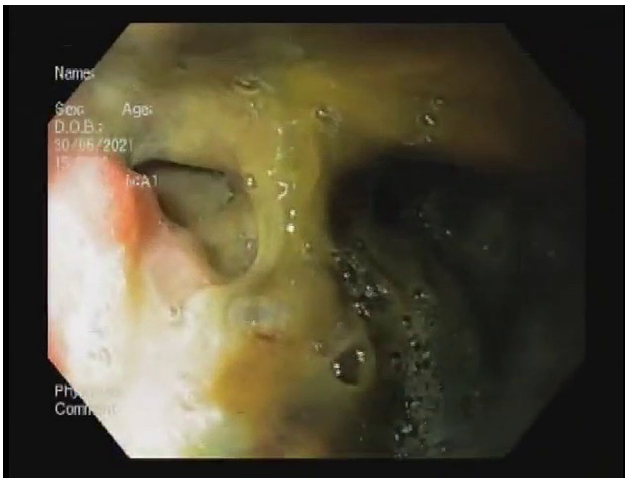
Case Presentation: 39-year-old male (BMI 48.8) presented to us on POD#9 after Robotic one anastomosis gastric bypass (OAGB) done elsewhere. Patient's records revealed tachycardia and hypotension on POD#1 with imaging revealing staple line hematoma without any leak. Patient was managed there conservatively in ICU receiving 4 units packed RBCs. Drain output ranged between 100-200ml/day until POD#8 when output increased to 1200ml and necessitated the transfer.

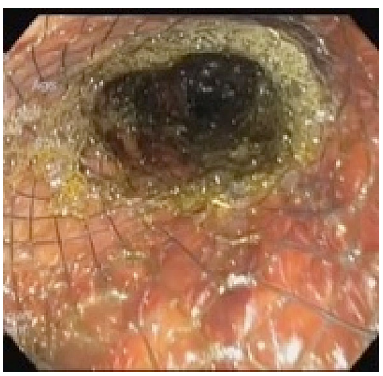
On admission, abdomen was distended, tender and drain output was 1500ml bilious, WBC of 22000/mm3. Repeat CECT revealed air admixed localized collection along anterior aspect of stomach and tracking underneath anterior abdominal wall, extravasation of contrast from GJ anastomosis into collection and into the drain with no other pelvic collections.

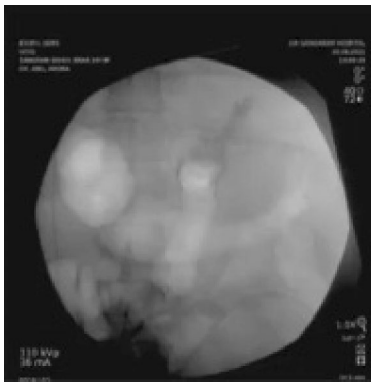




Considering the delayed and septicemic presentation, a multidisciplinary decision was taken to opt for endoscopic stent placement. On POD#9, a Mega 24 cm-long 26 mm-wide self-expandable metallic stent (SEMS) was placed from GE Junction to GJ site extending into efferent loop under fluoroscopic guidance. An NJ tube was placed for feeding.







Subsequently, drain output decreased to 350-500 ml/day. However, patient developed steatorrhea and jaundice likely from failure of bile to reach common limb from afferent loop. Drain's bilious contents were re-fed through NJ tube with resolution of steatorrhea over time.

CECT on POD#15 showed stent in-situ with smaller collection around GJ without any extravasation or new collections elsewhere. Subsequently, drain output reduced to 10-20 mL/day with no significant intra-abdominal collection seen. On POD#42, patient underwent repeat endoscopy showing completely healed mucosal defect and stent was removed with low-threshold to replace if needed. NJ tube replaced for feeding and removed 5 days later. Patient tolerated oral diet, weight decreased to 132 kg, and was discharged without any drains, stent or NJ tube.

Discussion: Postoperative leaks after OAGB range from 1–5%. One study with 2780 patients suggests that non-surgical management is successful in as many as 72% of cases. If endoscopy and interventional radiology are available, reoperation can be avoided in most patients.

Another study cites a much higher leak rate in revisional OAGB of about 4% vs. 1.3% for primary OAGB. OAGB complications are divided into anastomosis-related which resemble those of RYGB, and staple line-related resembling LSG. Anastomotic leaks controlled with stents exhibit a favorable outcome in contrast to staple line leaks. We present a case of anastomosis-related leak successfully managed endoscopically with a long self-expanding metallic stent as a viable option.

P127

Foregut Physiology After Bariatric Surgery: An Integrated Literature Review

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Introduction: As the prevalence of obesity and weight loss surgeries being performed increase in the United States, it is important to identify and understand the functional and nutritional consequences that occur in the foregut after bariatric surgery. Specifically, the adjustable gastric band (AGB), vertical sleeve gastrectomy (VSG), and the Roux-en-Y gastric bypass (RYGB) alter the anatomy and physiology of the digestive system and many patients experience changes in foregut motility, gastric acid secretion, reflux, and gastrointestinal hormone activity.

Methods and Procedures: A literature search for published full text articles on experimental and clinical studies written in the English language and published between 2000 and 2021 was performed using PubMed online database.

Results

	AGB	VGS	RYGB
Motility			
1.	Esophageal	1. Incomplete LES relaxation	1. Unclear
	2. Gastric	2. Unchanged	2. Increased gastric emptying
	3. Small bowel	3. Unchanged	3. Decreased small bowel motility due to ileal break
1.	Unchanged		
	2. Increased gastric emptying		
	3. Increased		
Acid	Secretion	Unchanged	Increased
Increased			
GERD	Decreased	Increased	Decreased
GI	hormones		
1. Ghrelin	1. Increased	1. Decreased	1. Decreased
2. Insulin	2. Unchanged	2. Decreased	2. Decreased
3. GLP-1	3. Unchanged	3. Decreased	3. Decreased
4. GLP-2	4. Unclear	4. Unclear	4. Unclear
5. GIP	5. Slightly increased	5. Unchanged	5. Unclear
6. PYY	6. Increased	6. Increased	6. Increased
Nutrients	Decreased food intake, no changes with absorption	Iron/B12 deficiency, no change in protein, fat, carbohydrate absorption	Iron/B12 deficiency, decreased fat absorption, no change in protein/carb absorption

Conclusion: Bariatric surgery alters the physiology and anatomy of the foregut which leads to changes in motility, gastric acid secretion, reflux, and gastrointestinal hormone activity. Given this, it is essential to recognize the functional and nutritional effects of commonly performed bariatric procedures in order to provide the highest level of care through the most appropriate surgery for the patient.

P128

Right Thoracoscopic (VATS) Truncal Vagotomy for Intractable Marginal Ulcer

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The obesity epidemic is globally recognized however it continues to rise not only in the United States, but also worldwide. This trend can be seen in the increased rate of bariatric surgeries being performed, with over 256,000 bariatric surgeries performed in the USA in 2019 alone, compared to 158,000 bariatric surgeries in 2011. Of these bariatric surgeries, a substantial number performed are Laparoscopic Roux-en-Y gastric bypasses (LRYGB) at 17% of the total bariatric surgeries in 2019. Following closely are revisional surgeries at 16.7% (Fig. 1.1).

A common complication following LRYGB is the formation of marginal ulcer (MU). This is reported in up to 16% of patients that have undergone the operation. Between 85–95% of patients who present with MU post-LRYGB are likely to respond to medical therapy. However, there is a select group of patients that continue to suffer from symptomatic, non-healing ulcers despite appropriate maximal medical treatment, and subsequently require surgical intervention.

Current approaches to surgical management include, surgical revision to resect the entire ulcer bed and recreate a new gastrojejunostomy. In 2020, Di Palma et al. illustrates that the success rates of revisional surgeries are low, with a recurrence rate of MU as high as 57%. In our case report, we discuss the rare incidence in which both maximal medical management and revisional surgery were unsuccessful. At which point the surgeon posed the patient with two options; reversal of LRYGB or truncal vagotomy to relieve the symptoms of the intractable non-healing marginal ulcer. The patient showed utmost reluctance to gastric bypass-reversal, as her percent weight loss was substantial; BMI 57 kg/M2 to 31 kg/M2, in turn the patient agreed to truncal vagotomy.

Although uncommon, surgical vagotomy plays a role in the treatment of these rare non-healing marginal ulcers seen post-LRYGB. As bariatric surgeries continue to rise annually, we should expect to see an increase in the incidence of these rare non-healing MU. With increasing rates, clinicians should be familiar with partial vagotomy as an option for treating these rare cases. Our case report shares a success story of a patient with a non-healing marginal ulcer refractory to medical management and revisional surgery. We share the patients EGD results which demonstrate a healed marginal ulcer 8 weeks post-operatively following a truncal VATS vagotomy.

P129

Bariatric Deserts: Regional Inequity in New York State Metabolic Surgery Access

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Introduction: During the last decade in New York State (NYS), there were less than 200 active bariatric surgeons each year for a population around 19 million citizens. With over 5 million of those residents affected with obesity, the distribution of these practitioners is of paramount importance to equity in care delivery.

Methods: Using 2006–2019 NYS inpatient and ambulatory data from the Statewide Planning and Research Cooperative System (SPARCS), 215,253 patients were identified that underwent metabolic surgery. Bariatric surgeons were also identified by billing codes. Patient and surgeon location data was mapped to zip code and county in New York. Patient demographics and comorbid diseases were compared via univariate statistical tests. Utilization of healthcare systems and billing charges in the year preceding surgery were also analyzed.

Results: Among the patients who underwent metabolic surgery, roughly 5.3% traveled more than 50 miles from their home to a surgical center ('travelers"). Age and gender were comparable, while less African American and minority patients traveled these long distances ($p < 0.01$). Comorbidities associated with morbid obesity, such as diabetes and hypertension were more common in the rural populations that traveled ($p < 0.01$). Travelers were also much more likely to have private insurance ($p < 0.01$). Utilization of healthcare resources one year prior to surgery was comparable, though travelers had marginally decreased (6.5%) charges. The most notable cluster of bariatric surgeons were in New York City and its surrounding boroughs (68% of entire state). However, there were eleven NYS counties with no bariatric surgeons, and four counties in NYS where 75% of more of the bariatric care received required 50 miles of travel or more – areas that could be described as bariatric deserts. Over the observation period, counties reduced their percentage of long-distance patients by 0.3% per year ($p = 0.04$). Overall, only 1% total of the NYS population received bariatric surgery between the years analyzed.

Conclusions: It is well known that metabolic surgery is underutilized in the US despite established evidence supporting lifelong health benefits for our increasingly obese population. Regional access to qualified services is one potential limitation to better care delivery. Analysis of NYS during the last 15 years revealed discrepancies in rural access to bariatric surgeons, both in distribution of bariatric surgeons and the resulting travel patterns required of eligible patients, with only marginal improvements. This study identifies regional and system healthcare inequities of access in New York State.

P130

Long-Term Effects of Laparoscopic Sleeve Gastrectomy up to 7 Years of Follow-Up

Rachael Barnes, MD; HCA

Background: Laparoscopic vertical sleeve gastrectomy (LSG) has been gaining popularity in the USA and worldwide, in fact it's the most commonly performed bariatric procedure in the USA. However, long-term results remain remarkably sparse.

Objective: To investigate the long-term effects of LSG, beyond 7 years, on % excess body weight loss (EBWL), Body Mass Index (BMI), resolution of various co-morbidities such as diabetes mellitus (DM), gastroesophageal reflux disease (GERD), obstructive sleep apnea (OSA), hypertension (HTN) and hyperlipidemia (HLP).

Setting: Private institution in Jacksonville, Florida (USA).

Methods: A retrospective chart review of 225 patients who underwent LSG as a primary procedure between years 2009–2012. We report on % EBWL over 7 years, immediate, < 30 days, 30–90 days, and > 90 days all cause readmissions. Resolution rate for DM, HTN, OSA, GERD and HLP are also reported.

Results: 225 patients had LSG as a primary metabolic procedure, 37.3% had simultaneous hiatal hernia (HH) repair, the mean operating time was 61.7 ± 15.3 min (34–123) with a mean hospital length of stay of 2 ± 2 days (1–31). The mean pre-operative BMI was 44.4 ± 8.4 kg/m2 (31.9–79.8). The mean BMI at 6 months, 1, 3, 5 and 7 years was 37.6 kg/m2, 34.3 kg/m2, 31.7 kg/m2, 32.6 kg/m2, and 32.7 kg/m2 respectively.

All cause re-admissions at 30 days, 30–90 days and > 90 days was 6.2%, 9.8% and 21.8% respectively. Co-morbidities resolution rates were: 51.4% for DM, 53.9% for hypertension, 67.1% for OSA, 80.0% for GERD, and 18.0% for HLP. 2.7% of patients developed de novo GERD after LSG.

Conclusions: Even though there is considerable weight regain after 1 year of LSG, results are maintained at 7 years. There is also a significant resolution of associated co-morbidities with limited evidence of increased GERD.

P131

Primary Duodenal Diverticulum Caliculi Resulting in Small Bowel Obstruction: A Case Report

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While duodenal diverticulum are not a common occurrence, however stone formation in these diverticuli are exceedingly rare, with only 35 published cases to date. Here we describe the presentation of a patient with a primary diverticulum stone that initially presented with abdominal pain and bloating. Imagining at initial presentation led to conservative management of a retroperitoneal perforation. This management eventually failed and was followed by surgical intervention with treatment following a cholecystoduodenal fistula algorithm, including distal small bowel stone removal at the index operation and interval cholecystectomy. Final pathology of the gallbladder demonstrated normal gallbladder. Patients with this rare presentation should be able to avoid interval cholecystectomy if there is reasonable evidence the obstructing stone is not primarily from the gallbladder.

Fig. 1 Initial Presenting CT finding with presumed perforated duodenal diverticulum with bezoar in axial view

Fig. 2 Duodenal diverticulum without stone in axial view (a) and distally obstructing stone in coronal view (b)

Fig. 3 MRCP demonstrating normal gallbladder without clear evidence of cholecystoduodenal fistula

P133

Postoperative Pain in 5 mm vs 10 mm Epigastric Port for Lap Cholecystectomy: A Randomized Controlled Trial

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Introduction: This RCT compared whether postoperative pain in minilaparoscopic cholecystectomy is lower if a 5 mm port is used in the epigastrium compared to a 10 mm port, while keeping the total length of all four incisions at 25 mm. A procedure was described as "mini-laparoscopic cholecystectomy" if only one 10 mm port and rest all 5 mm ports were used.

Methods and Procedures: Seventy-two consenting adult patients undergoing elective mini-laparoscopic cholecystectomy were randomized using www.randomization.com equally to undergo the procedure with either a 5 mm or 10 mm epigastric port. Patients with previous abdominal surgery, coexisting conditions like hernia, or a history of acute cholecystitis or acute pancreatitis in the preceding 6 weeks were excluded from the trial. If a patient was randomized to undergo surgery with a 5 mm epigastric port, a 10 mm umbilical port was used and vice-versa. All the patients were given intravenous paracetamol 1 g postoperatively, thereafter oral paracetamol 650 mg was given on demand for pain. Breakthrough pain was managed by administering tramadol injection. Postoperative pain was measured at 6 h, 7 days and 30 days using an 11 point numerical rating scale (NRS).The surgeons and patients were not blinded. The assessor of postoperative pain and the statistician were blinded to the groups. The data was analysed using SPSS 28. Postoperative pain was compared using the independent samples median test. Operative time and complications were also recorded. The trial registration number is CTRI/2020/11/028955

Results: The two groups were demographically comparable. The mean (SD) age was 48 (14) and the mean BMI was 25 (4.7). Data on postoperative pain was not normally distributed. The median (IQR) pain at 6 h in patients with 5 mm epigastric port was 4(5) compared to 6(4) in patients with 10 mm port in the epigastrium. While the effect size appears large, this was not statistically significant. Similar results, with marginally less postoperative pain in patients with 5 mm epigastric port was observed at 24 h, 7 days and 30 days of operation. Operating time and complications were similar in both groups.

Conclusion(s): The difference in postoperative pain is not statistically significantly different if a 5 mm port is used in the epigastrium compared to a 10 mm port. The large effect size suggests that further trials with a larger sample size may be warranted.

P136

Laparoscopic Cholecystectomy and Unroofing of a Hepatic Cyst in a Patient with Polycystic Liver DISEASE

Kevin Butler, DO; Feroze Tejani, MD; Indraneil Mukherjee, MD; Northwell Health—Staten Island University Hospital

We demonstrate a 48-year-old female with a medical history of polycystic liver disease, polycystic kidney disease, and brain aneurysms status post clipping, presenting for biliary colic. She was worked up outpatient for right upper quadrant abdominal pain for 3–4 months consistent with fat intolerance. Pre-operative CT of her abdomen-pelvis was showing a large hepatic cyst abutting the gallbladder infundibulum, amongst innumerable other surrounding hepatic and renal cysts. She underwent laparoscopic cholecystectomy in addition to deroofing of her major liver cyst in order to minimize hepatobiliary injury. A Jackson-Pratt drain was placed secondary to leaking serous fluid. She was discharged on postoperative day 3 with outpatient follow-up. This case highlights the complexity of performing a laparoscopic cholecystectomy for symptomatic biliary disease in the setting of polycystic liver disease.

P137

Robotic Versus Laparoscopic Cholecystectomy: A Meta Analysis

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Background: Laparoscopic cholecystectomy (LC) remains the gold standard management of benign gallbladder disease. The adoption of the robotic platform that offers high-resolution 3-dimensional images, dexterity, better range of motion, and precise control in comparison to laparoscopic cholecystectomy (LC) into general practice is still lacking. Recent data on the safety and efficacy of Robotic cholecystectomy (RC) in comparison to LC has not yet been analyzed. The aim of this study is to evaluate the effectiveness and safety of RC compared to LC for gallbladder disease from articles published after 2017.

Methods: A systematic review was conducted using EMBASE, PubMed, and Cochrane Library databases (from December 2017 to September 2021) to identify comparative studies investigating the safety and efficacy of RC in comparison to LC. The outcomes analyzed include operative times, estimated blood loss (EBL), length of hospital stay (LOS), intraoperative and postoperative complication rates, bile leaks, and conversion to open and/or conventional laparoscopy. Results are expressed as differences in means with standard deviation (SD) and odds ratio (OR). Statistical analysis was done using random-effects meta-analysis to compare the mean difference (MD) and OR of the separate groups (Comprehensive Meta-Analysis Version 3.3.070 software; Biostat Inc., Englewood, NJ).

Results: Fourteen studies were quantitatively assessed and included in this meta-analysis. A total of 3,196,661 patients were included with 43,202 patients who underwent RC and 3,148,234 patients who underwent LC.

RC had longer operative times (MD = 18.86 min, 95% CI [5.17–32.19], p = 0.007) but shorter LOS (MD = -0.25 days, 95% CI [-0.44—-0.06], p = 0.009) when compared to LC.

Estimated Blood Loss (EBL) (p = 0.09), operative complications (p = 0.57), conversions (p = 0.14), and bile leak (p = 0.10) were similar between both groups.

Conclusion: Robotic Cholecystectomy is as safe and efficacious as Laparoscopic Cholecystectomy with a shorter length of stay in the hospital.

P140

COVID-19 Impacts Severity of Acute Cholecystitis and Emergency Presentation

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Introduction: The COVID-19 pandemic has had far-reaching health implications beyond the public health impact of the virus that has yet to be fully elucidated. We hypothesized that COVID-19 impacted the severity of benign biliary disease and as a result led to an increased incidence of emergency cholecystectomy and complexity of disease.

Methods: Our institutional experience with elective and emergency cholecystectomies from February 2019 until February 2021 (n = 1,595) was reviewed. Patients before the start of the COVID-19 pandemic starting in March 2020 were compared to patients after the pandemic. Patients undergoing cholecystectomy during transplant, surgical oncology, trauma, and pediatric surgery procedures were excluded. Baseline characteristics were compared between patient groups. A Cochran-Armitage test for trend was used to determine the temporal impact of COVID-19 on emergency presentation and complexity of gallbladder disease at our institution.

Results: 441 patients pre-pandemic and 470 patients post-pandemic who underwent emergency or elective cholecystectomy were identified. There were no significant differences between groups before or after the pandemic began with regards to age, sex, BMI, or ASA class. There was no difference in distribution of operative approach (lap, robotic, open), rate of conversion to open procedure (1.9% pre vs. 2.0% post, p = 0.9), or mean operative time (92.6 min pre vs 96.7 min post, p = 0.2). Postoperative outcomes between the groups also did not differ as both groups had similar rates of complications (2.8% pre vs. 3.9% post, p = 0.4), readmissions (3.8% pre vs. 2.7% post, p = 0.3), and return to the operating room (1.0% pre vs. 1.4% post, p = 0.7). COVID-19 significantly impacted both emergency presentation and severity of disease in a Cochran-Armitage test for trend. A significantly higher percentage of emergency presentations occurred after the start of the pandemic (43.2% pre vs. 56.8% post, p = 0.0003) and there was a significantly increased frequency of severe gallbladder disease including cholecystitis (53.2% pre vs 61.8% post) and gangrenous cholecystitis (2.8% pre vs 6.1% post), p < 0.0001. Additionally there was a trend towards increased rate of subtotal cholecystectomy (3.0% vs. 5.4%, p = .06), but this was not statistically significant.

Conclusions: We identified that the COVID-19 pandemic resulted in an increased incidence of emergency presentation for gallbladder disease and increased complexity of gallbladder disease. Despite the delayed presentation, clinical outcomes were comparable. These findings are reassuring and further studies are needed to determine the implications for other disease processes thought to be affected by COVID-19.

P141

The Clinical Outcome of Laparoscopic Cholecystectomy Beyond 72 Hours After Onset in Acute Cholecystitis Under Era of Early Cholecystectomy Fashion

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Background: Early laparoscopic cholecystectomy (ELC) is the standard treatment of choice in almost acute cholecystitis (AC) patients and should operated within 72 h after onset. Although, this early cholecystectomy fashionare most recently recommended, many of patients have to perform late laparoscopic cholecystectomy (LLC) beyond 72 h of symptom according to limitation of patients condition and tightness of operating theater schedule.However lack of evidence support these LLC outcome.

Objective: This study aim to compare clinical outcome of early laparoscopic cholecystectomy (ELC) and late laparoscopic cholecystectomy (LLC) in acute cholecystitis patients.

Method: 1,319 laparoscopic cholecystectomy (LC) performed during January 2014 to December 2020 in Bhumibol Adulyadej Hospital. There were124 LCs underwent for admitted acute cholecystitis patients were reviewed and classified as ELC and LLC. Primary outcome was total length of hospital stay, Secondary outcome were post-operative hospital stay, conversion rate, operative time, blood loss and complication.

Result: We analysis124 LCs for AC patients and classified as ELC 49 patients and LLC 75 patients. Both group showed no significant difference in patient characteristic (Gender, Age,ASA classification and severity grading by Tokyo guideline 2019). The LLC significantly higher blood loss than ELC (144 vs 77 ml, p = 0.025, 95%CI (-124.7,-8.4)) and total length of hospital stay (9.39 vs 6.24 day, p = 0.001, 95%CI(-4.8,-1.4)), However postoperative hospital stay in both group were no significantly differences (5.47vs5.08, p = 0.614,95%CI(-2.0,1.22)). Moreover, there were no significant differences in conversion rate (5.4% vs 4%, p = 0.751, 95%CI(-0.91,0.06)), operative time (136 vs131min, p = 0.5601, 95%CI(-22.2,10.9)) as well as operated relate complication (9.3% vs 8.1%, p = 0.388, 95%CI(-0.149,0.05)).

Conclusions: Late laparoscopic cholecystectomy in acute cholecystitis performing beyond 72 h of symptom onset are safely performed under circumstance experience surgeons and selected patients.

Keywords: Acute cholecystitis, Early laparoscopic cholecystectomy, Late laparoscopic cholecystectomy

P146

Don't Drop the Stones: A 15-year Experience of Dropped Gallstone Complications at a Single Institution

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Introduction: Dropped gallstones with spillage occur anywhere from 3 to 19% of minimally invasive cholecystectomies. Several case reports in the literature elucidate the presentations and consequences of post-cholecystectomy gallstone abscesses, but few evaluate the patient care and cost burden. This case series aims to report the long-term sequelae of retained gallstones and associated financial costs.

Methods: In this retrospective case series, 10 patients were identified with post-cholecystectomy gallstone complications in a single hepatobiliary surgeon's experience at a tertiary medical center from 2006 to 2021. IRB approval was obtained, and analysis of patient characteristics, procedures, and financial costs was conducted by chart-review.

Results: Among the 10 patients in the case series, the mean age at presentation was 69.4, and 80% of whom were male. Baseline patient characteristics included a mean BMI of 31, ASA greater than 3 (80%), Diabetes (40%), current tobacco use (10%), and concurrent steroid use (10%). Of the initial cholecystectomies, 80% were laparoscopic, and the indications included symptomatic stones (cholelithiasis or choledocholithiasis; 40%), infectious (cholecystitis or cholangitis; 50%), and gallstone pancreatitis (10%). The time from initial cholecystectomy to re-presentation ranged from 1 month to 16 years post op, with a mean of 4.8 years. There was an average of 3.5 interventional procedures and 2.6 operations associated with a dropped gallstone, with an average cost per procedure of $11,346.41.

Conclusion: Dropped gallstones have costly long term consequences to patients and the healthcare system. As we continue in the era of minimally invasive cholecystectomy, greater care to retrieve dropped stones at the index procedure should be taken to prevent these long term complications.

P147

Diagnosis and Treatment of Lemmel's Syndrome Causing Obstructive Jaundice: A Case Report

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Introduction: Obstructive jaundice is a common manifestation that is often associated with choledocholithiasis and biliary or periampullary tumors. Lemmel's Syndrome (LS) occurs when obstructive jaundice occurs in the absence of choledocholithiasis or pancreatico-biliary or periampullary tumors and secondary to the presence of periampullary diverticula (PAD). Small PAD remains asymptomatic and rarely require treatment. Larger PAD may obstruct the ampulla of Vater and cause obstructive jaundice. We describe a case of LS treated with endoscopic retrograde cholangiopancreatography (ERCP), sphincterotomy and stent placement.

Case Presentation: A 79 year old female presented to the emergency department with epigastric pain with associated nausea and vomiting. Initial workup was notable for hyperbilirubinemia (1.9), with CT evaluation revealing a 3 cm duodenal diverticulum and subsequent multiplanar, multi-sequence MRI performed demonstrating a duodenal diverticulum measuring approximately 4 cm in transverse dimension impinging on the head of the pancreas and mildly dilated extrahepatic and intrahepatic bile ducts. There were no filling defect within the bile ducts. Patient underwent an ERCP in which a sphincterotomy was performed within the papillotome. A 9–12 mm balloon was used to make multiple sweeps on the common bile duct. Cholangiogram did not reveal filling defects. The patient did have a distal common bile duct stricture likely from external compression from her diverticulum. A 10 mm × 60 mm fully covered wall flex stent was deployed in the common bile duct. Patient post procedure had resolution of her symptoms with normalization of her bilirubin.

Conclusion: PAD occurs predominantly in the elderly with an increased female frequency. The incidence of (PAD) is estimated to be 1 to 27%, with an incidence of 10 to 15% of patients undergoing ERCP. MRCP/ERCP evaluation may be performed to visualize the common bile duct and identify the various causes of obstructive jaundice including Lemmel's Syndrome.

P149

Laparoscopic Cholecystectomy in Situs Inversus Totalis Using Fluorescence Imaging by Indocyanine Green (ICG) in Rural Louisiana

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Introduction: Laparoscopic procedures in Situs Inversus Totalis (SIT) can be very challenging to surgeons. Better understanding of anatomy is the key in any laparoscopic procedure. We report a case of laparoscopic cholecystectomy in patient with SIT with chronic cholecystitis using fluorescence imaging by Indocyanine green (ICG) from a community hospital in rural Louisiana.

Presentation of Case

54 yr old male with known history of SIT came to the emergency room with complaints of intermittent episodes of left upper abdominal pain with nausea and vomiting. Evaluation with CT scan showed multiple gallstones and mild enhancement of the gall bladder wall (Image I & II). We scheduled for Laparoscopic Cholecystectomy with fluorescence imaging by ICG.

About one hour prior to surgery, we injected 25 mg of ICG diluted with 10 cc of normal saline intravenously. We placed our laparoscopic trocars as "simple mirror positions" on left upper abdomen compared to regular trocar position. However, the left mid port was placed about 5 cms inferior to costal margin for better accessibility. The epigastric port was placed to the left of falciform ligament. Diagnostic laparoscopy showed gall bladder in left upper abdomen with some adhesions which were taken down with hook cautery. We then switched the camera to Infrared vision and was clearly able to define the anatomy of calot's triangle with cystic duct and common bile duct. We switched back to normal vision camera and after meticulous dissection and getting a critical angle of safety, we clipped

and divided the cystic artery and duct. Patient tolerated procedure well. Pathology showed Chronic cholecystitis. He had an uneventful recovery and is doing well.

Discussion: Laparoscopic cholecystectomy in patients with SIT have been described and there are about 100 reported cases. Apart from placing the trocars in mirrored position on left upper abdomen and standing on patients' right side, not many changes in technique are needed if we follow the basic principles of laparoscopic cholecystectomy. Simple injection of ICG and using fluorescent imaging clearly enhances visualization of calot's triangle as the ICG is excreted in bile and the infrared camera detects fluorescing ICG as it passes through the biliary system.

Conclusion: Laparoscopic cholecystectomy can safely be performed in Situs Inversus Totalis in a community setting and using fluorescent imaging with ICG will enhance the visualization of biliary anatomy.

P150

Gallbladder Volvulus, an Unusual Entity. Case Report and Literature Review

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Introduction: Gallbladder volvulus is an uncommon entity in clinical practice, first described by Wendel in 1898, with only approximately 500 cases reported since that date. It occurs mostly in older adult patients, with an average age of 77 years, it is more common among women, with a female:male ratio of 4:1, in childhood, it occurs with a male:female ratio of 2.5:1. Its preoperative diagnosis is difficult (less than 10% of cases), often being confused with other diseases, due to its similar clinical manifestations; leading many times to chronic symptomatic treatments, especially in countries other than Chile, where acute cholecystitis is not always a surgical indication.

Objective: To report a clinical case of a gallbladder volvulus, diagnosed in the intraoperative in order to familiarize ourselves with this entity, to suspect it and offer the appropriate management.

Materials and Methods: Review of a clinical case, using the Hospital's electronic clinical record. The review of the literature was made using Pubmed.

Results: 73-year-old female patient who attended with acute abdomen pain; suspecting acute cholecystitis with choledocholithiasis. Initially, ERCP was performed to unblock the bile duct, confirming choledocholithiasis and releasing purulent content. A few days later, a laparoscopic exploration was performed, in order to execute a cholecystectomy, with the finding of a gallbladder volvulus. Due to its difficult handling and poor diagnostic certainty, it was necessary to convert it into an open procedure using a Kocher incision, achieving cholecystectomy without incident. The patient progressed satisfactorily with early discharge.

Discussion and Conclusion: Gallbladder volvulus is an infrequent disease, therefore, a high suspicion is needed for its diagnosis.

Certain predisposing characteristics have been proposed, such as the presence of congenital malformations, visceral ptosis due to aging as result of the loss of adipose tissue and visceral elasticity in older adults, an exaggerated increase in intestinal peristalsis, kyphoscoliosis and multiparity. Gallstones are associated in 25–50% of cases.

Clinical presentation and radiological findings are similar to acute lithiasic cholecystitis, and it must be surgically removed to avoid gallbladder perforation, biliperitoneum and shock. Laparoscopic cholecystectomy should be considered as the first therapeutic option.

P151

Bile Leakage Post Cholecistectomy. Injury of a Remnant Surface Bile Duct. A Unusual Anatomic Variant. Case Report and Literature Review

Javier Kuri;Francisco Galeana; Karla Lujan; Manuel Aguirre; Juan José Solorzano; Oscar Mendoza; Katia Picazo; Hospital Ángeles Pedregal

The prevailing anatomy of a structure is called "normal", all different anatomy is considered: "abnormal or aberrant". In the anatomy of the bile duct, this concept is a paradigm, since it is considered a normal pattern in only 50–60% of individuals, with a variability of 50 to 40%, this is called bile duct variants. Case of a 42-year-old female, started postoperatively (48 h of laparoscopic cholecystectomy) with abdominal pain in the epigastrium and back pain. Initial abdominal CT scan with little fluid in the pelvic cavity, surgical bed without collections. Abdominal pain persists, cholangioresonance is performed, without findings of bile leakage, or collections. When pain persisted, endoscopic ultrasound and transduodenal fine needle cholangiography were performed. Abdominal pain increased and a control CT study documented a retroperitonal collection greater than 200 cc. Percutaneous drainage with 400 ml of bile fluid is performed and the patient goes to ERCP, where bile leakage is identified and an aberrant left duct injury is determined. A sphincterotomy is performed and an 8Fr endoprosthesis is placed, it evolves torpidly with high percutaneous drainage output greater than 400 ml in 24 h, performing a control CT scan, with increased collection in the retroperitoneum, a second percutaneous drainage is placed, obtaining bile fluid. The endoprosthesis is removed and a new selective balloon cholangiography is performed at the confluence level, injecting contrast medium under pressure, and a patent bile duct derived from the left hepatic duct is identified that leaks in the distal segment over the liver parenchyma at the confluence level. Left and right endoprosthesis were placed for ERCP, at 24 h there was an immediate decrease in output, resolution of the symptoms of nausea and abdominal pain, it was started orally 24 h after the last ERCP, adequately tolerating the removal of drains to 6 days after double stent placement. It was decided to present the case with the aim of showing an uncommon cause of bile leak and the conduct to be followed, which allowed the resolution of the case without requiring aggressive surgical management that would increase the morbidity and mortality of the patient, such as reoperation. that could hardly have elucidated the origin of the bile leakage.

P153

Replaced Right Hepatic Artery Pseudoaneurysm Rupture and Hemorrhagic Cholecystitis: A Case of Chicken or the Egg

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Introduction: Replaced right hepatic artery pseudoaneurysm rupture and hemorrhagic cholecystitis are extremely rare and life-threatening complications that have never before been reported concomitantly. We present the case of an 82 year old male with hemoperitoneum secondary to a replaced right hepatic artery pseudoaneurysm rupture and hemorrhagic cholecystitis that was successfully treated. A comprehensive literature review on visceral artery pseudoaneurysm rupture and hemorrhagic cholecystitis as well as a treatment algorithm will be provided.

Case Report: An 82-year-old male with a past medical history significant for coronary artery disease and endocarditis complicated by vegetations status post recent coronary artery bypass graft and heart valve repair, paroxysmal atrial fibrillation on eliquis, gastroesophageal reflux disease and hypertension presents from cardiac rehab to the emergency department for syncope, chest pain, and abdominal pain. On presentation the patient is afebrile, hypotensive to the 70 s systolic, tachycardic, and tachypneic. On physical exam his abdomen is soft, mildly distended with right upper quadrant tenderness to palpation. His labs include a hemoglobin 9.9, uptrending troponin, lactic acid 5.57, and grossly unremarkable liver function enzymes and bilirubin. A CT angiogram shows active arterial extravasation from a replaced right hepatic pseudoaneurysm as well as intracholecystic hemorrhaging. The patient is given Kcentra and resuscitated with intravenous fluid and blood products. The patient undergoes successful coil embolization of the replaced right hepatic artery and subsequent laparoscopic cholecystectomy the following day. The patient recovers well and is discharged on hospital day five.

Conclusion: We presented a case of successful treatment of a replaced right hepatic artery pseudoaneurysm rupture and hemorrhagic cholecystitis in a patient with a significant cardiac history on eliquis. We believe this to be the first such case reported in medical literature, however other similar cases involving hemorrhagic cholecystitis and other visceral artery pseudoaneurysm ruptures have also been reported. It is difficult to discern whether nearby visceral artery pseudoaneurysms arise as a consequence of inflammation from cholecystitis or if hypotension secondary to blood loss from an arterial pseudoaneurysm rupture can cause ischemia to the gallbladder resulting in cholecystitis. Given the existing but limited literature, a timely diagnosis of this rare and potentially fatal condition is critical and involves an integrated approach including adequate resuscitation, coagulopathy reversal, arterial embolization and cholecystectomy.

P155

Outcomes for Colectomy for Colon Cancer in the Elderly Population

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Introduction: Assessment of outcomes for colon cancer surgeries in the elderly population is of increasing importance as the general US population ages. The objective of this study is to analyze 30-day surgical outcomes following colectomy for colon cancer among the elderly.

Methods: The National Surgical Quality Improvement Program (NSQIP) was queried for patients who underwent colectomy for colon cancer between Janurary 2012 and December 2019. The cohort was narrowed to 92,727 patients after excluding those with ascites, preoperative sepsis and renal failure, emergency cases, ASA 5, ventilator dependent, and intraoperative finding of disseminated cancer. Patients were then separated by age into greater than 65 years (> 65) and under 65 years (< 65) groups. Demographics and postoperative variables were then compared between the groups. A logistic regression model was generated for death.

Results: 36,569 cases were included in the < 65 group and 56,158 cases in the > 65 group. There were statistically significant differences between groups for all demographic variables. Hispanic ethnicity, minimally invasive surgery (MIS), smoking, chemotherapy, and preoperative bowel prep were more common in the younger group. Every other demographic variable was more common in the elderly. Univariate analysis revealed that there were significantly increased odds of worse postoperative outcomes among the elderly, including increased rates of reoperation (OR = 1.087, p = .020), length of stay (t = -35.762, p < .001), operative time (t = 36.507, p < .001), and death (OR = 4.800, p < 0.01) within 30 days post colectomy in the elderly group compared to the younger group. In the multivariate regression model, age > 65 (OR = 3.414, p < .001), dependent functional status (OR = 2.853, p < .001), dyspnea (OR = 1.471,p < .001), male sex (OR = 1.437, p < .001), CHF (OR = 2.462, p < .001), COPD (OR = 1.655, p < .001), dialysis (OR = .020, p = .020), steroid use (OR = 1.500, p = .036), non-elective surgery (OR = 1.950, p < .001), higher ASA class (OR = 2.7599, p < .001), and preoperative antibiotic bowel prep (OR = .633, p < .001) were independent predictors for death.

Conclusions: This large retrospective review demonstrates the increased risk factors for 30-day postoperative mortality after colectomy in the surgical management of colon cancer for elderly patients.

P156

Intussusception Secondary to Adenocarcinoma of the Colon: A Case Report and Literature Review

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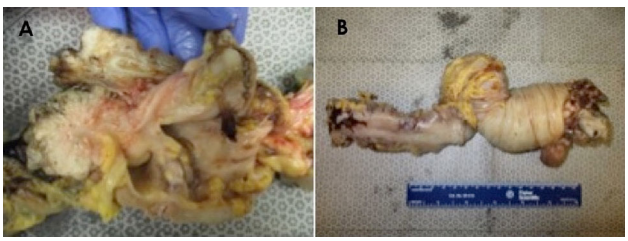
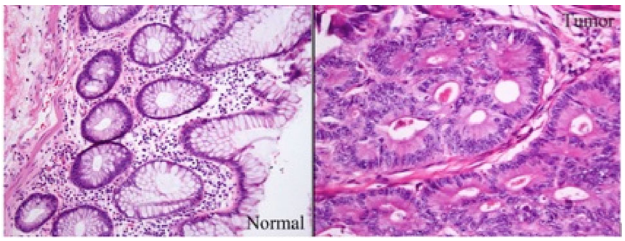
Introduction: Intussusception is a process that occurs when one segment of bowel and adjacent mesentery (intussusceptum) telescopes into a downstream segment of bowel (intussuscipiens). This condition is one of the most common causes of bowel obstruction in children; however, this process accounts for approximately 1–5% of bowel obstructions in adults. Computed tomography (CT) is the standard for diagnosis in adults. Adult intussusception is associated with underlying organic pathology in greater than 50% of cases. In this report we describe a case of sigmoid intussusception caused by adenocarcinoma and its management.

Case Report: A 67-year-old male presented to the emergency department (ED) with complaints of vague abdominal pain and hematochezia. Physical exam was significant for moderate distention and firmness of the left lower quadrant. A CT scan demonstrated intussusception involving the sigmoid colon with bowel wall thickening [Fig. 1]. A flexible sigmoidoscopy showed dusky appearing mucosa of the intussuscipiens. A laparotomy was performed and the intussusception was palpated, but not reduced. A large, firm mass was found to be the lead point [Fig. 2]. The sigmoid colon was resected and an end descending colostomy was created. Surgical pathology was positive for moderately differentiated adenocarcinoma with invasion through the muscularis propria [Fig. 3]. Two of 54 lymph nodes were positive resulting in T3N1b disease. He was discharged home on post-operative day 4 without complications. The patient presented back to the ED four days after discharge and was found to have acute deep venous thrombosis. A CT scan of the abdomen and pelvis was obtained which showed multiple sub centimeter low-density lesions throughout the liver. Magnetic resonance imaging (MRI) and CT guided biopsy of one of the hepatic nodules was consistent with metastasis. After discussion at a multi-disciplinary tumor board and the decision was made to consult palliative care and a decision as made to proceed with comfort care.





Conclusion: Intussusception is rare in adults accounting for 1–3% of bowel obstructions. Although rare, when this process occurs it is commonly associated with underlying malignant pathology. In contrast to pediatric intussusception the treatment for adult intussusception is surgical. Unlike the pediatric population intussusception in adults should not be reduced and must undergo en bloc resection since it invariably harbors grave pathology like cancer. Our case highlights the importance of recognizing that the most likely cause of intussusception in adults is malignancy and the need for surgical intervention is remains the gold standard of management.

P158

Transanal Lateral Lymph Nodes Dissection Combined with Laparoscopic Approach for Lower Rectal Cancer: An Initial Experience of 10 Cases

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Aim: Laparoscopic lateral pelvic lymph node dissection (LLND) has been reported to be feasible. Transanal LLND is a still challenging technique with a few reports. We present the technical aspects and surgical outcomes of transanal LLND combined with laparoscopic approach for lower rectal cancer.

Methods: We retrospectively analyzed the prospectively collected data of 10 consecutive patients who underwent transanal LLND combined with laparoscopic approach from January 2019 to August 2021. Intraoperative adverse events, operative time, blood loss, postoperative complications, length of hospital stay, pathological findings were assessed.

Transanal LLND: After confirming S4 nerve, parietal pelvic fascia was dissected at anal side of S4 nerve to enter the surgical plane. Dissection was proceeded between the vesicohypogastric fascia and pre-hypogastric nerve fascia to rendezvous with laparoscopic dissection. Then the internal iliac lymph nodes (263 group) were removed confirming the internal iliac vessels and inferior bladder vessels. Next, dissection was performed between the vesicohypogastric fascia and the obturator nodes (283 group). Dissection was proceeded to rendezvous with laparoscopic dissection. Finally, the dissection was performed along the levator ani muscle up to the obturator internus muscle. Dissection was proceeded to rendezvous with laparoscopic dissection, confirming the internal pudendal vessels and inferior bladder vessels. Then, the obturator nodes were removed, preserving the obturator nerve and dissecting the obturator vessels.

Laparoscopic LLND: It was simultaneously performed with transanal LLND. After confirming the ureter, incision of the peritoneum was performed just lateral to the ureter at pelvic inlet level. The dissection proceeded between the vesicohypogastric fascia and pre-hypogastric nerve fascia. Dissection was proceeded to rendezvous with transanal dissection. Next, dissection was performed between the vesicohypogastric fascia and the obturator nodes. Dissection was proceeded to rendezvous with transanal dissection. Finally, after confirming the external iliac vein, parietal pelvic fascia was dissected along the external iliac vein. The dissection was proceeded along the psoas muscle and the obturator internus muscle down to levator ani muscle. Dissection was proceeded to rendezvous with transanal dissection.

Results: Intraoperative adverse events occurred in 2 patients. The mean operative time and amount of blood loss were 626 min and 133 g, respectively. Postoperative complications occurred in 8 patients., including 7 of Clavien Dindo classification with grade II and 1 of grade IIIa. The mean length of hospital stay was 20 days.

Conclusion: Transanal lateral lymph nodes dissection combined with laparoscopic approach may have a potential benefit to LLND for lower rectal cancer.

P160

The Value of Transanal Endoscopic Intersphincteric Resection (taE-ISR) in Extreme anal Preservation in Ultra-Low Rectal Cancer: A Single-Center Retrospective Study

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Background: Anal preservation for patients with ultra-low rectal cancer is a worldwide challenge. Intersphincteric resection (ISR) is an alternative for ultra-low rectal cancer. However, this technique does not contain the purse-string suture procedure so that undesired tumor spillage might occur. Besides, surgeons might encounter an unclear surgical field exposure. The transanal total mesorectal excision (TaTME) technique might compensate for the deficiencies of ISR. Thus, we decided to perform ISR through a transanal endoscopic approach (taE-ISR), seeking to evaluate the value of this innovative technique in extreme anal preservation in ultra-low rectal cancer.

Methods: 25 patients underwent taE-ISR from July 2018 to March 2021 were retrospectively enrolled. During the procedure, a transanal port was utilized. All the patients underwent a part of ISR followed by a purse-string suture, and then proceeded to complete ISR afterwards. Patients baseline characteristics, perioperative outcomes, pathological outcomes and short-term follow-up were investigated.

Results: The median age of the patients was 48 years (range 29 to 63). The median tumor distance from the anal verge was 3.6 cm (range 2.5 to 5). Eight patients were treated with neoadjuvant chemoradiotherapy, and two of whom received pathologic complete remission (PCR). The median operative time was 160 min (range 130 to 230). The median intraoperative blood loss was 80 ml (range 30 to 120). Pathological results indicated that all the tumor stages were $\leq$ T2 (with/without neoadjuvant therapy). Negative circumferential resection margin (CRM) and distal resection margin (DRM) were reached in all patients. After surgery, three (12%) cases suffered anastomotic leakage and five (20%) patients developed defecation disorders. The failure rate of anal preservation was 12%, including two (8%) cases converting to abdominoperineal resection (APR) and one (4%) case incompetent to receive stoma closure due to anastomotic stenosis.

Conclusion: the taE-ISR technique combines the advantages of TaTME in terms of surgical field exposure with the benefits of ISR in surgical precision. The implementation of taE-ISR seems safe and effective, and the role it plays in extreme anal preservation of ultra-low rectal cancer should be taken into account.

Key words: transanal endoscopic approach, intersphincteric resection, extreme anal preservation, ultra-low rectal cancer.

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Case Report: Management of Iatrogenic Colon Perforation

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As screening colonoscopies become more prevalent so too has the prevalence of associated complications. The most serious complication is iatrogenic perforation due to the leakage of bowel contents into the peritoneal cavity leading to sepsis and sometimes death. The risk of colonic perforation after diagnostic colonoscopy is 0.03–0.9% with morbidity up to 40% and mortality up to 25%. Management involves timely intervention and varies based on clinical picture: time of detection, level of bowel prep, clinical presentation, and size of defect. Interventions include endoscopic clipping, suture repair, resection & anastomosis, or washout with some form of bowel diversion. Our case report documents one incidence of iatrogenic colonic perforation during routine colonoscopy and reviews the operative management of this patient. The case report also discusses the indications for surgical intervention as compared to antibiotics alone, laparoscopy vs. open approach, suture repair vs. resection & anastomosis, intraoperative colonoscopy, choice of antibiotic coverage, and diet advancement. The patient discussed in this case was a 66-year-old female with past medical history of hypertension, gastroesophageal reflux disease, and surgical history of open cholecystectomy and three prior c-sections. She was referred to the ED by her gastroenterologist after having visualized the underside of her liver during routine colonoscopy. She had abdominal pain, was afebrile with a HR 60, BP 93/56, RR 17, 99%O2 on room air with a distended and diffusely tender abdomen. Laboratory results showed a Lactate of 2.0, and a WBC of 7.79. Chest x-ray demonstrated left basilar opacity with free air under bilateral hemidiaphragms. The patient thus underwent diagnostic laparoscopy with extensive lysis of adhesions where perforation at the hepatic flexure was identified and closed with multiple figure-of-eight 3–0 silk sutures. Intraoperative colonoscopy revealed no other enterotomies as well as an intact repair with a negative leak test. Patient was discharged on post-operative day four on metronidazole and levofloxacin with no associated morbidities or mortality. In this case, the patient's injury was detected early and her physical exam warranted intervention. Intraoperatively, her bowel prep was determined to be adequate and the defect size was amendable to suture repair alone. In our report, we hope to provide further insight on management options in order to achieve favorable outcomes.

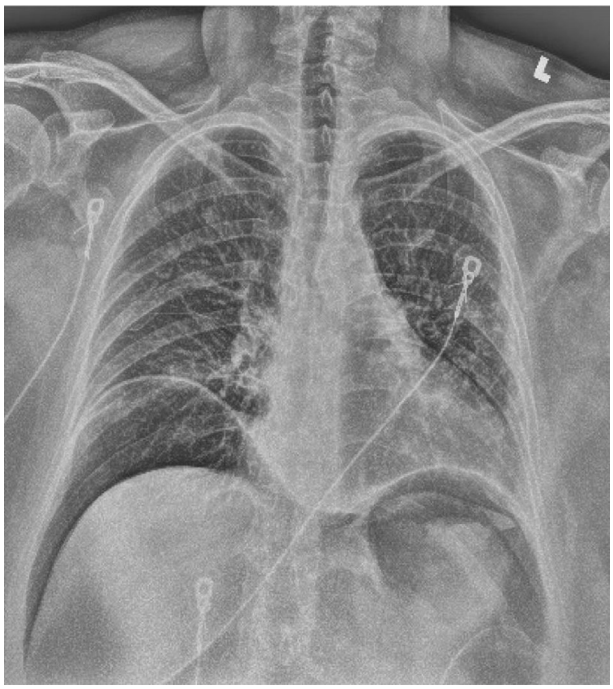

Image A: CXR showing free air under bilateral hemidiaphragms

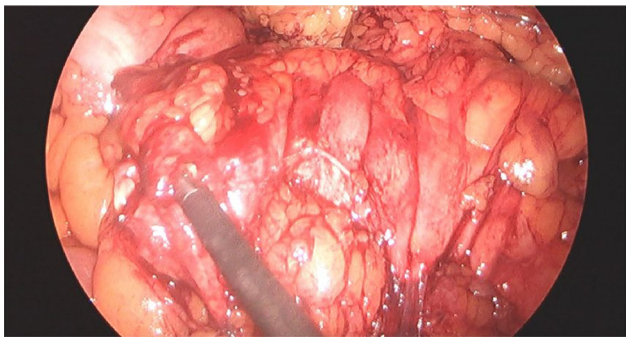

Image B: Colonic perforation denoted by instrument

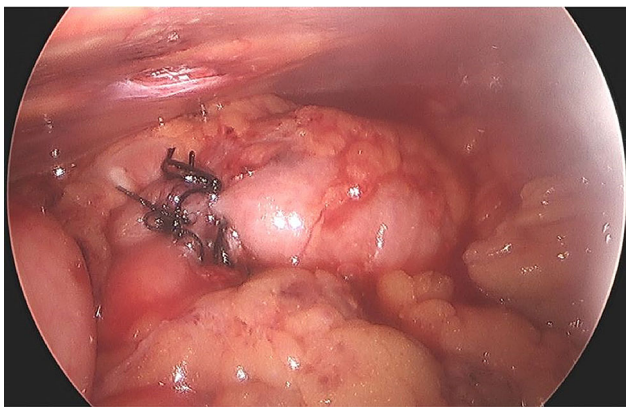

Image C: Figure-of-8 suture repair with 3–0 sillk

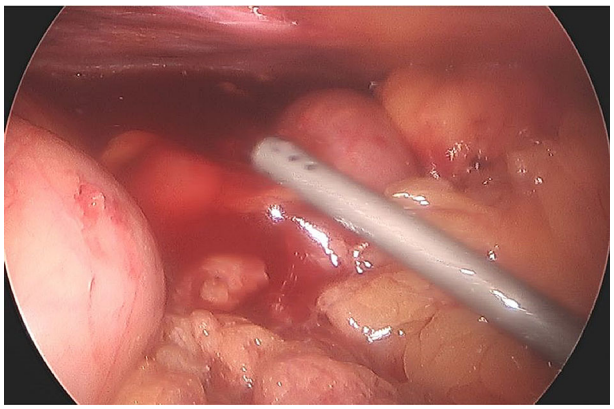

Image D: Negative leak test with air insufflation, no bubbles appreciated

P163

Reducing the Surgical Site Infections Rate in Colorectal Surgery Patients. Role of High Flow supplemental Oxygen. A Metanalysis

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Introduction: Surgical Site Infections (SSI), with an overall incidence of 2.8% in the United States (US), have always been challenging to manage despite the revolutionary advances in sterile techniques and optimum preoperative care. The association between oxygen and its oxidative antibacterial killing, mediated through the neutrophils, has long been established. Postoperative patients receive oxygen routinely for adequate saturation, but whether hyperoxia can decrease SSI remains debatable. The current metanalysis is an effort to explain the controversies in the literature regarding the role of perioperative oxygen supplementation in minimizing the risk of postoperative SSI.

Method: Data was collected after an extensive literature review from PubMed, Google Scholar, and Cochrane library. All those randomized control trials (RCTs) which assessed the role of various concentrations of supplemental oxygen on the postoperative SSI rates were included in the study. Data on all the patients with major abdominal surgery were collected and then divided based on the subspecialty. Fractional inspired oxygen (FiO2) of $> 80\%$ was categorized as high supplement oxygen, while Fio2 $< 30\%$ was labeled as low supplement oxygen.

Results: A total of 14 RCTs were found eligible to be included in the current meta-analysis. For the entire cohort, including all the major abdominal surgeries, no difference in the rate of SSI was noticed (Risk Ratio (RR) = 0.8, confidence interval (CI) = 0.7–1.0, p = 0.22). However, supplementing high flow oxygen in patients who underwent colorectal surgery led to a 44.1% decrease in the SSI rate.

Conclusion: Supplementing patients with high and low fraction oxygen to reduce the SSI has always been controversial and limited data is available. Our cohort showed that high fraction supplemental oxygen showed favorable outcomes in reducing the SSI in patients with colorectal surgery only. More studies mainly focused on analyzing the risk SSIs based on the surgery method (minimally invasive vs. laparoscopically) are needed to understand better the role of oxygen supplementation and SSI reduction rate, particularly in colorectal surgery.

P164

Robotic Platform da Vinci Xi is Feasible and Beneficial Both in Colon and Rectal Surgery

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Background: The limitation of laparoscopic surgical system for rectal excision promote the progression of robotic platform including wristed instrument and better 3D vision. Although the previous trials did not confer definitely superior outcome in rectal resection compared to conventional laparoscopy surgery. The rational are not only the problem of learning effect, but also facing the difficulty of mechanical limitation such as dimensional rotation limit of the formerly used robotic system before 2014. This study is aim to evaluate the benefit and feasibility of using robot-assisted method both in colon and rectal surgery.

Method: Since the daVinci Xi system was installed in our hospital in 2020, we performed not only rectum but also colon resectionsince 2020 Mar-2021 Aug. All patients received robotic assisted colorectal surgery were enrolled. The patients underwent laparoscopic colorectal surgery in the same period were also been collected for comparison.The major indication for operation is neoplasm.The patient characteristics, clinical course, short term outcomes and surgical associated factors were reported and analyzed.

Result: Among the 110 patients received robot-assisted surgery, 48.2%(N = 53) received low anterior resection; 37.3%(N = 41) received left-side colon resection(including anterior resection and left hemicolectomy) Right hemicolectomy was performed in the other 16 patients (14.5%). The re-operation rate was 1.8%(N = 2), and the overall complication rate was 3.6%(N = 4). The average operation time was 5.0 h. The length of stay was 6.77 days.

Conclusion: The current robotic platform have slimmer arms, extended instrument length and patient clearance technology to avoid external collision and extend working area at the same time. The enhanced surgeon autonomy on the robotic platform also implements the detailed operations. Both colon and rectal surgery can be performed by single docking and providing good surgical outcomes. Although the overall operation time of the robotic assisted surgery maybe longer, but the reduced complication, shorter length of stay and reliable outcomes should be recommended both in the colon and rectal surgery.

P165

Cost of Stoma-Related Hospital Readmissions for Rectal Cancer Patients Following Restorative Proctectomy with a Diverting Loop Ileostomy: A Nationwide Readmissions Database Analysis

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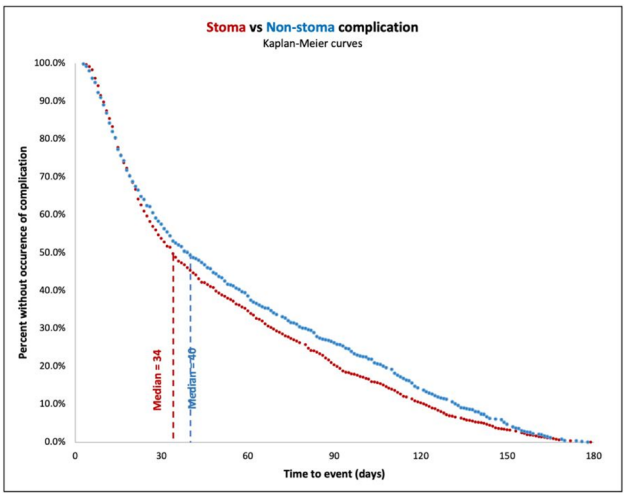
Introduction: Rectal cancer patients often undergo creation of a diverting loop ileostomy (DLI) to prevent the clinical consequences of an anastomotic leak. Unfortunately, stomas are not without their own complications; however few studies have investigated the associated costs. The goal of this study was to Characterize long-term risks for readmission with stoma-related complications and their concomitant costs.

Methods: This was a retrospective cohort study using the Nationwide Readmissions Database. Adult patients admitted with a primary rectal neoplasm (ICD-9/10 codes) who underwent restorative proctectomy (RP) with DLI (2010–2018) were identified. Patients operated on between January-June were retained to allow for up to 6-months post-operative follow-up of all patients. The date of RP and DLI defined cohort entry. Six-months post-RP and DLI or the time of DLI closure (whichever came first) defined cohort exit. Patients were grouped based on 1) no readmission, 2) readmission for non-stoma related complications, or 3) readmission for stoma-related complications. Main outcome measures were emergency readmission for stoma-related complications (ICD-9/10 codes) and total cost of care (index admission for RP and DLI + readmission). Multivariate logistic and linear regression were used to identify risk factors and cost of readmission for stoma-related complications, respectively.

Results: Of 10,066 patients with RP and DLI, 16.5% (N = 1,665) were emergently re-admitted, and of those, 58.7% (N = 977) were for stoma-related complications which included: dehydration and acute renal failure (82.1%), stomal obstruction or stenosis (5.2%), and stomal fistula, hernia or prolapse (2.5%). Patients readmitted with stoma-related complications were significantly older [62.4 ± 11.2 vs 58.93 ± 11.86 (no readmission) vs 57.7 ± 11.8 (non-stoma related complications) years, $p < 0.0001$) and experienced complications earlier relative to their index surgery compared to those with non-stoma-related complication readmissions (46.3 ± 45.0 vs 74.9 ± 44.5 days, respectively) (Figure-1). On multiple logistic regression, patients were more likely to be readmitted with a stoma-related complication if they were female (OR 1.231 95%CI 1.069–1.419) and had history of radiotherapy (OR 1.289 95%CI 1.115–1.49). On multiple linear regression, after adjusting for age, comorbidities, and hospital-factors, stoma-related complications were independently associated with a $59,749.90 increase in total cost of care, while non-stoma-related complications were associated with a $45,930.92 increase.

Discussion: Readmissions for stoma-related complications following RP and DLI are common and represent a substantial proportion of the rectal cancer patients' total cost of care. Increased support and consideration of selective early ileostomy closure could help reduce the financial burden on patients and the health care system.



P166

Colectomy Outcomes In Smokers Versus Nonsmokers in a Veteran Population

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Introduction: Tobacco use is known to be higher in the military and veteran populations compared to the general civilian population. The goal of this study is to examine the effect of smoking on outcomes after colectomy in veterans.

Methods and Procedures: The Veterans Affairs Surgical Quality Improvement Program (VASQIP) database was queried for colectomies performed between 2000 and 2019. Patients with ascites, ASA class V, disseminated cancer, pre-operative sepsis, pre-operative coma, ventilator dependence, and emergent cases were excluded. Independent sample t-tests and Chi Square tests were used to compare demographics and outcomes between smokers and nonsmokers.

Results: After exclusions, 35,333 patients were identified (10,542 smokers and 24,791 nonsmokers). Compared to nonsmokers, the smokers were more likely to be younger, have lower BMI, be black, have dyspnea, COPD, drink > 2 drinks/day of alcohol, have undergone radiation therapy, and have independent functional status. Nonsmokers were more likely to be male, have diabetes, CHF, hypertension, bleeding disorder, chronic steroid use, and require dialysis before surgery. Smokers had shorter mean operative time and were more likely to have wound class 3 or 4. Smokers also had higher rates of return to the OR within 30 days (9.2% smokers vs 7.2% nonsmokers, $p < .001$), post-operative sepsis (4.5% vs 3.8%, $p = .002$), failure to wean off the ventilator within 48 h after surgery (2.8% vs 2.1%, $p < .001$), post-operative pneumonia (3.5% vs 2.4%, $p < .001$), require reintubation (3.2% vs 2.3%, $p < .001$), wound dehiscence (3.1% vs 1.9%, $p < .001$), and have deep and superficial surgical site infections (superficial: 7.7% vs 6.3%, $p < .001$; deep: 1.8% vs 1.4%, $p = .005$). Nonsmokers had higher rates of DVTs (0.9% vs 0.5%, $p < .001$), pulmonary emboli (0.8% vs 0.4%, $p < .001$), and urinary tract infections (2.9% vs 2.4%, $p = .006$). There was no significant difference in post-operative hospital length of stay, 30-day all-cause mortality, cardiac arrest requiring CPR, MI, CVA/stroke, significant post-operative bleeding, acute renal failure, or prolonged post-operative ileus.

In a multivariate regression model, higher ASA class (OR 2.319, $p < .001$), concurrent pneumonia (OR = 3.128, $p = .009$), pre-operative weight loss (OR = 1.954, $p < .001$), increased age (OR = 1.066, $p < .001$), bleeding disorder (OR = 2.399, $p < .001$), COPD (OR = 1.304, $p = .023$), dyspnea (OR = 1.709, $p < .001$), dependent functional status (OR = 3.503, $p < .001$), wound class 3/4 (OR = 1.411, $p = .007$), and smoking (OR = 1.374, $p = .007$) were independent predictors for increased risk of death.

Conclusion: Despite being younger with fewer comorbidities, smokers undergoing colectomy had higher rates of post-operative pulmonary complications, sepsis, and wound complications than nonsmokers. However, there was no difference in all-cause 30-day mortality.

P167

Study of Single-Incision Laparoscopic Ileocecal Resection in Obese Patients

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Introduction: Minimally invasive surgery has become popular for colorectal cancer, and we have introduced Reduced Port Surgery (PRS) in our department for less invasive surgery. In general, obese patients are known to increase the difficulty of surgery and postoperative complications, but not many studies have been done on single-incision laparoscopic surgery.

Objective: Comparison of the short-term results of single-incision laparoscopic ileocecal resection (SILS-ICR) and conventional laparoscopic ileocecal resection (c-ICR) for patients with a BMI of 25 or more in our department.

Methods: A total of 19 SILS-ICR and 100 c-ICR patients who underwent laparoscopic ileocecal resection in our department with a patient BMI greater than 25 between January 2014 and March 2021 were retrospectively compared for treatment outcomes.

Results: The median age was 73 [33–84] years for SILS-ICR and 71 [43–90] years for c-ICR. The median BMI was 27.0 [25.0–32.0] for SILS-ICR and 27.0 [25.0–37.0] for c-ICR. There was a significant difference in the operation time (SILS-ICR 114 min vs. c-ICR 155 min, $p < 0.01$) in both groups, but no difference in the number of lymph nodes harvested, tumor diameter, bleeding, days to start diet, days of hospital stay after surgery, or complications greater Clavien-Dindo Grade II.

Conclusion: The single-incision laparoscopic ileocecal resection for obese patients in our department was performed safely without increasing the complications compared with conventional laparoscopic ileocecal resection.

P168

Refractory Fulminant Colitis Requiring Subtotal Colectomy in a Patient with Ulcerative Colitis on Atezolizumab Therapy for Non-Small Cell Lung Cancer: An Atypical Case

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Introduction: Atezolizumab (Tencentriq) is a programmed death-ligand 1 (PDL-1) targeted antibody that prevents binding of PDL-1 to specific T-cell receptors, thereby increasing anticancer immunity. It has been regarded as a useful first-line treatment in patients with small cell lung cancer with a more tolerable side effect profile than chemotherapeutic agents. However, few studies focusing on the severity of adverse effects from immune checkpoint inhibitors (ICPI) have been previously reported, in particular acute, fulminant colitis requiring surgical invention.

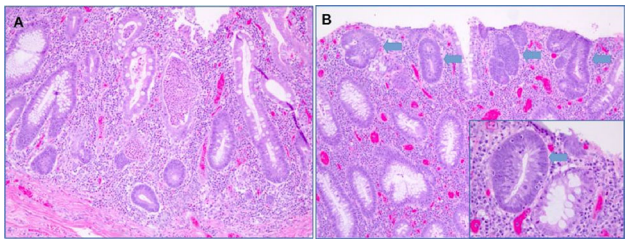
Case Presentation: In this paper, we report a case of fulminant colitis that was refractory to high dose corticosteroid treatment in a patient with known ulcerative colitis (UC) undergoing treatment for small cell lung cancer (SCLC) with atezolizumab. We performed an exploratory laparotomy, pancolectomy, and creation of an ileostomy. The patient had an uncomplicated postoperative course and was discharged from the hospital on postoperative day 12.

Discussion: The upregulation of PDL-1 expression in patients with ulcerative colitis may play a significant role in an imbalanced T-helper cell response creating a pro-inflammatory state. The use of ICPIs to treat SCLC has been reported to increase the risk of developing inflammatory colitis. The use of atezolizumab in a patient with known inflammatory bowel disease (IBD) may predispose this population to a higher risk of developing severe inflammatory colitis.

Conclusion: We present an unusual complication associated with medical intervention in an immunocompromised patient without an established pathophysiology. The suspicion of using ICPIs in patients with IBD as a potential cause for the development of fulminant colitis is relevant and essential in the diagnostic workup for this patient population complaining of significant gastro-intestinal symptoms.

Fig. 1 Coronal view showing moderate pancolitis. Red arrows indicate significant bowel wall thickening to the cecum, ascending, and descending colon

Fig. 2 Ulcerative colitis-associated low-grade dysplasia. (A). Severe ulcerative colitis with marked acute inflammatory activity, crypt distortion, and reactive crypt epithelial change. (B). Low-grade dysplasia (arrows) involves the surface, indicating lack of surface maturation. The dysplastic gland (arrow in the insert) has epithelial cells showing pseudostratified, crowded, elongated and hyperchromatic nuclei, compared to an adjacent non-dysplastic gland. The nuclear polarity is preserved



P169

Low-Grade Appendiceal Mucinous Neoplasm (LAMN) in a 46-Year-Old Male

Kangmin Kim, MD[1]; Raydiene Doorgen[2]; Karla Luketic, MD[1]; Peter M DeVito, MD[1]; [1]Western Reserve Health Education; [2]American University of Antigua

Neoplasms of the appendix are very rare with an incidence of around 1%. These malignancies are usually asymptomatic, with a majority of cases being discovered incidentally in patients only presenting with signs and symptoms of appendicitis. The Peritoneal Surface Oncology Group International (PSOGI), Chicago Consensus Working Group, and the American Joint Committee on Cancer (AJCC) have established diagnostic guidelines, diagnostic criteria, and multidisciplinary management recommendations for appendiceal neoplasms and peritoneal surface malignancies. Among these diagnostic guidelines include criteria for low-grade appendiceal mucinous neoplasm (LAMN). This case report describes a case of LAMN to highlight the current options and complications involved in the surgical and medical management of LAMN.

P170

Synchronous Medullary Colon Cancer and Porcelain Gallbladder: Case Report and Review of Current Literature

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Background: Medullary colon carcinoma is a rare subtype of cancer that accounts for less than 1% of all colon malignancies. It closely resembles poorly differentiated adenocarcinoma and neuroendocrine carcinoma of the colon. However, on histologic examination medullary colon cancer does not exhibit glandular formation as typically seen in adenocarcinoma, tests negative for neuroendocrine markers and displays a high degree of microsatellite instability (MSI). Porcelain gallbladder are found incidentally in 1% of all cholecystectomies. Although historically this has been linked with gallbladder carcinoma, the risk is now understood to be much lower. There are no reports of patients with both porcelain gallbladder and medullary colon cancer.

Methods: We report an 80 year old woman referred to our office for a right sided colonic mass after diagnostic colonoscopy for anemia. Her past medical history includes anemia, chronic kidney disease, hyperlipidemia, and hypertension. A follow up computerized tomography (CT) scan confirmed the presence of the mass at the hepatic flexure and revealed the presence of an incidental porcelain gallbladder. She underwent a robotic extended right hemicolectomy in addition to a robotic cholecystectomy. She recovered well from the procedure and was eventually discharged home. Unfortunately, she then contracted COVID-19 and died several weeks later.

Results: Preoperative assay for circulating tumor DNA (ctDNA, Colvera®) targeting methylated *BCAT1/IKZF1* was positive, in addition to a CEA value of 3.0 ng/mL. Negative surgical margins were achieved following her extended right hemicolectomy with zero out of 12 pericolonic lymph nodes positive for metastases. There was no evidence of dysplasia or malignancy of the gallbladder.

Conclusion: This is the first case report of medullary colon cancer presenting with a synchronous porcelain gallbladder. Given that both of these diagnoses are rare individually, it is especially uncommon that they both presented synchronously in our patient. If this patient did not succumb to COVID-19 infection, multidisciplinary discussion recommended treatment similar to colonic adenocarcinoma with no adjuvant therapy and close surveillance.

P171

Comparison of Laparoscopic Surgery with Open Surgery for T4b Colon Cancer

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Background: Laparoscopic surgery for advanced colorectal cancer is becoming widespread. However, a subgroup analysis of the JCOG0404 study in Japan reported that laparoscopic surgery for T4 cases had a poor prognosis. The validity of laparoscopic surgery for T4 colon cancer is currently unclear.

Objective: This report aimed to clarify the safety of laparoscopic surgery for T4b colon cancer by comparison with open surgery.

Methods: We enrolled 80 patients with T4b colon cancer who underwent primary resection in our hospital from April 2007 to July 2016. We divided 80 patients into open surgery group (group O) and laparoscopic surgery group (group L). The clinicopathological features and prognosis were compared with two groups.

Results: Group O consisted of 50 patients and group L consisted of 30 patients. There were no significant differences in the sex, CEA, abdominal surgery history, preoperative ileus, or abscess formation. Right hemicolectomy/ transverse colon partial resection/ left hemicolectomy/ partial resection of the descending colon/ sigmoid colectomy/ Hartmann operation/ high anterior resection/ total pelvic exenteration were performed in 18/2/2/15/9/1/3 cases of group O and 21/2/2/5/0/0/0 cases of group L ($p = 0.010$), respectively. When compared according to the invaded organs, the uterus, adnexa, and vagina group and the bladder, prostate, seminal vesicle, and seminal duct group were significantly more common in group O ($p = 0.046$, < 0.001), and the greater omentum was significantly more common in group L ($p = 0.005$). The operation time of group L was significantly shorter ($p < 0.001$), and the amount of bleeding ($p < 0.001$) and intraoperative blood transfusion ($p < 0.001$) of group L were significantly less. There were no significant differences in the dissection area and the curability. The postoperative hospital stay was significantly shorter in group L ($p < 0.001$). Postoperative complications with Clavien- Dindo classification 3 or higher were 5 cases in group O and no cases in group L. In brief, more severe complications occurred significantly in group O ($p = 0.034$). As for pathological factors, pN was significantly worse in group L ($p = 0.022$). No significant difference was found in other pathological factors. Regarding long-term results by curability, there were no significant differences in overall survival, cancer-specific survival, and progression-free survival.

Conclusions: It was suggested that laparoscopic surgery can be safely performed for T4b colon cancer. Further study should be performed by accumulating more cases that are selected properly.

P172

Rising Trends in Emergency Department Visits for Bowel Dysfunction in Rectal Cancer Patients: A Nationwide Emergency Department Sample Database Analysis

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Introduction: Bowel dysfunction causes major physical and emotional distress among rectal cancer patients, most of whom have undergone restorative proctectomy and/or chemoradiotherapy, resulting in poor quality of life. The objectives of this study were to: a) quantify the national rates of emergency department (ED) visits for bowel dysfunction; b) identify clinical factors associated with changes in ED visits for bowel dysfunction over time.

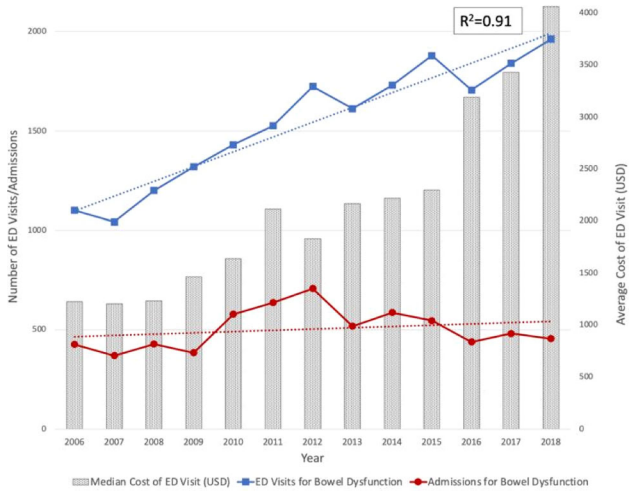
Methods: This was a retrospective cohort study using the Nationwide Emergency Department Sample database. Adult patients with a rectal neoplasm who presented to ED from 2006–2018 were identified. The main outcome was ED visits for bowel dysfunction, defined as stool incontinence, frequency, urgency, clustering, and perianal pain/skin irritation, using ICD-9/10 codes. Patients presenting with infectious/inflammatory bowel conditions were excluded. Discharge-level weights were used to generate national estimates of ED visits. Simple and multiple linear regression were used to describe trends in the frequency of ED visits for bowel dysfunction over time and identify corresponding changes in risk factors over time. Co-variates for the models were chosen a priori and included sociodemographic factors, comorbidities, chemo/radiotherapy, and hospital characteristics.

Results: Of 541,982 rectal cancer patients who presented to ED, 20,079 patients (3.7%) presented primarily for bowel dysfunction. The number of ED visits for bowel dysfunction significantly increased ($R2 = 0.91$, $p < 0.001$), from 1,100 in 2006 to 1,963 in 2018, accompanied by a significant rise in cost of ED visits ($R2 = 0.87$, $p < 0.001$) (Fig. 1). Patients who presented to ED for bowel dysfunction had a mean age of 60.6 years (± 14.5), 4,651 (23.2%) had metastatic disease, and

3,604 (17.9%) had a history of chemo/radiotherapy. Most patients (n = 13,529, 67.4%) were discharged home from ED, while 6,550 (32.6%) were admitted. Change in frequency of bowel movements (n = 12,589, 62.7%) was the most common bowel symptom experienced, followed by perianal pain/skin irritation (n = 6,997, 34.8%). On multivariable regression, more recent ED visits for bowel dysfunction were associated with age < 65 years (β = 0.024, p = 0.003), number of physical comorbidities (β = 0.066, p < 0.001), number of mental health conditions (β = 0.019, p = 0.008), history of chemotherapy (β = 0.138, p < 0.001), and lowest income quartile (β = 0.053, p < 0.001).

Conclusion: The nationwide frequency and cost of ED visits for bowel dysfunction in rectal cancer patients is increasing. Younger age, physical and mental health comorbidities, and chemotherapy are associated with this rise. Outpatient resources to support rectal cancer patients with bowel dysfunction are needed to address this burden.

Figure 1: National Trend in ED Visits and Admissions for Bowel Dysfunction (2006-2018)



P174

Ambulatory Colectomy and Selecting the Proper Patient: Criteria for Inclusion and Protocol for a Safe Discharge

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Ambulatory colectomy, or same day discharge, is an emerging concept that has recently begun to gain interest. Though from a small amount of published literature and our own review we have found that it can be done, a population on whom this is safe to be performed upon needs to be defined. Therefore, this report further describes our preoperative patient selection and evaluation for appropriate discharge. Of which, our inclusion criteria were based on determining the patient who is both medically safe for consideration, as well as ensuring those who have the proper outpatient support and adequate means of communication. We included patients in our population if they harbored one or fewer significant comorbidities, had limited anticoagulation or antiplatelet use, and minimal prior abdominal surgeries. Furthermore, to be considered for ambulatory colectomy, patients had to have an adequate amount of outpatient support with someone at home that would be not only willing, but physically able to help provide regular care and assessments. Additionally, it was discussed with the patient preoperatively what their means of communication were. This was important to the success of our population as we were in contact with our patients on post-operative day one and were available if they had any issues prior to their first follow-up appointment on day seven. In conjunction with the importance of a preoperative rigorous and safe patient selection, immediate post-operative criteria must be fulfilled in order to be appropriately discharged. As such, we further describe the protocol that must be completed in the post-operative anesthesia care unit prior to evaluation for hospital discharge. This protocol includes criteria such as tolerating at least a clear liquid diet and pain control with oral medications, amongst several other factors. Upon review of our own patient population, we are beginning to see that same day discharge following colectomy is a viable option. However, we do acknowledge that the safety and benefits of this procedure are witnessed in only a select patient population. Therefore the authors of this paper feel it is pertinent to report both our preoperative and postoperative protocols in order to identify the applicable patient population, as well as provide information for safe practice in other institutions.

P175

Neuroendocrine Tumor of Colon with Colocolonic Intussusception—Rare Tumor with Rare Presentation

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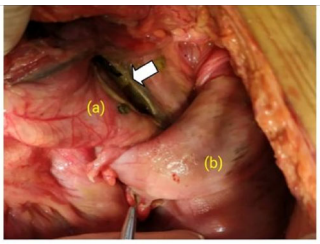

Introperative image showing splenic flexure(a) as intussusceptum and descending colon(b) as intussuscipiens and perforation in splenic flexure(arrow)

Post operative day 1 – on reexploration showing ileal gangrene

A 35 year old female came with abdominal distension, bilious vomiting and non passage of stools for 5 days. She had h/o ATT intake for abdominal Kochs. On examination tachycardia, tachypnea with abdominal distension and absent bowel sounds. Xray abdomen reveals multiple air fluid levels. On exploration a colocolonic intussusception at splenic flexure with 2 × 0.5 cm perforation just proximal to intussusception and 2 perforations on hepatic flexure were found, Extended right hemicolectomy was done which on cut section showed 2 × 2 cm polypoidal growth as leadpoint. On Post operative day1 due to gangrenous stoma reexploration was done and gangrenous ilealsegment was resected. Cause of gangrenous ileal loop was vascular thrombus at the root of the mesentery of SMA. Histopathology report suggests of small cell neuroendocrine carcinoma with presenceof vascular emboli (positive for EMA, CD56, Synaptophysin, chromogranin).

** I believe its the first case ever recorded of colocolic intussuseption with neuroendocrine tumour as the lead point at splenic flexure **

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Colo-Rectum Mechanical Intracorporeal Anastomosis, Assisted by Robot: Surgical Technique

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Robot-assisted surgery allows new surgical procedures to be performed, an example is intracorporeal anastomosis, this has a positive impact on the post-surgical evolution of patients, reducing associated complications such as surgical site infection, incisional hernia and prolonged hospital stay. Surgical technique: all patients underwent a left colectomy with a standardized technique and subsequent to the section of the colon, a mechanical intracorporeal lateral-terminal anastomosis was performed colo-rectum. Four trocars are placed (one subxiphoid and three right laterals), prior to the section of the colon, vascularity is verified with indocyanine green and a colotomy is performed on the antimesenteric border at 2 cm, in the avascular colon segment confirmed by indocyanine green. the anvil is introduced to the colon, then at 2.5 cm a second full thickness incision is made, where the tip of the anvil comes out and is fixed with a 3–0 barbed monofilament purse, the colotomy is also closed. Subsequently, the proximal colon is sectioned with a stapler and the anastomosis is performed with a circular stapler. To extract the surgical piece, an enlargement of the lower right wound is made (maximum 5 cm), and an Alexis retractor is placed, with this we avoid making a Pfannenstiel-type incision. Pneumatic testing with flexible rectosigmoidoscopy is performed to rule out leaks. This technique can be reproducible and safe, with good postoperative results, reducing intraoperative complications of an extracorporeal anastomosis (traction of the mesocolon, bleeding) as well as a reduction in postoperative complications.

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A Rare Case of Adenocarcinoma Within the Columnar Cuff After Restorative Proctocolectomy for Familial Adenomatous Polyposis

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Introduction: Restorative proctocolectomy (RPC) with ileal pouch anal anastomosis (IPAA) is a standard treatment option for patients with familial adenomatous polyposis (FAP). When using the double stapling technique there is rectal mucosa left behind.1 According to Thompson-Fawcett et al., this rectal mucosa is termed the columnar cuff and is located just proximal to the anal transition zone (ATZ).2 This colorectal tissue has the potential for neoplastic transformation. We report the fourth patient with FAP to develop invasive columnar cuff carcinoma after restorative proctocolectomy and their management.

Case report: The patient is a 47-year-old female with a past medical history of FAP status post proctocolectomy with restorative IPAA at age 30 in Puerto Rico who was referred to the colorectal office for a rectal mass found on imaging. 17 years later, after endoscopic polypectomy of a periampullary adenoma she had developed pancreatitis with a large pancreatic pseudocyst requiring endoscopic drainage. During the workup her computed tomography (CT) scan showed a 5 cm mass just distal to her IPAA. She subsequently underwent pelvic MRI, which showed the mass arising from the rectal cuff with extension into the submucosa (Fig. 1). Flexible sigmoidoscopy showed a near circumferential mass arising from the rectal cuff and biopsy was positive for adenocarcinoma (Fig. 2). The patient was discussed at multidisciplinary tumor board and received neoadjuvant FOLFOX for 6 weeks. She underwent pouch excision and ileostomy. Postoperatively she required percutaneous drainage of a pelvic abscess, but is otherwise doing well. Pathology showed a well differentiated rectal adenocarcinoma arising from a polyp and 0/14 positive lymph nodes (T1N0M0) (Fig. 3).

Discussion: Virtually all patients with FAP will develop colorectal cancer in their lifetime if not treated surgically.3 Total colectomy with ileorectal anastomosis (IRA) and IPAA are the two most common surgeries. IPAA has a decreased risk of subsequent adenocarcinoma in the tissue left behind compared to IRA, which is ~ 30%. Cancer after IPAA is rare with only 23, 69, and 3 documented cases of cancer within the ileal pouch, ATZ and columnar cuff, respectively. Currently, a double stapled IPAA is the standard procedure. Preservation of the ATZ allows for functional advantage; however, this also leaves a risk of malignant transformation of the ATZ and rectal cuff. Therefore, yearly endoscopic surveillance with columnar cuff and pouch biopsies is recommended. If cancer is diagnosed a multidisciplinary approach should be taken and surgical excision of the pouch is typically required.

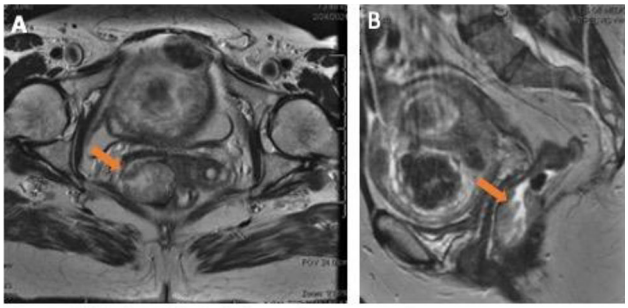

Figure 1 – Axial (A) and sagittal (B) view of columnar cuff mass (orange arrows)

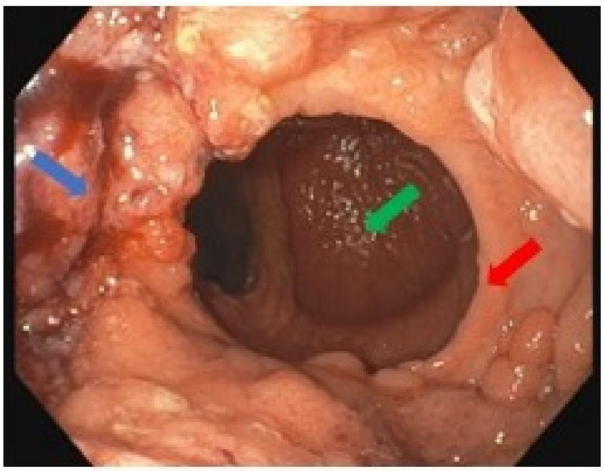

Figure 2 – Endoscopic view of polypoid lesion within the rectal cuff (blue arrow). Anastomosis (red arrow). J-pouch (green arrow)

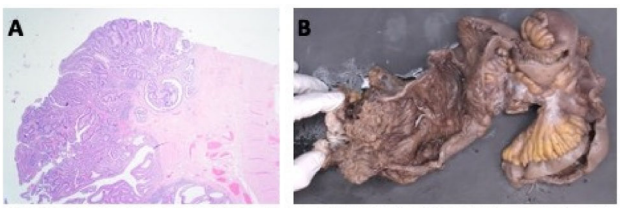

Figure 3 – (A) H&E stain low power view of adenomatous polyp with focus of adenocarcinoma invading into the submucosa. (B) Gross pathology of polypoid lesion of rectal cuff.

P179

Fluorescence Angiography with Indocyanine Green for Low Anterior Resection in Patients with Rectal Cancer: A Prospective Before and After Study

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Background: Total mesorectal excision is known to be the treatment of choice for low rectal cancer. Colorectal anastomosis are however associated with significant anastomotic leak rates, ranging from 10 to 20%. Many factors have been associated with increased rates of anastomotic leaks including inadequate proximal bowel perfusion. New innovations are now available to assess bowel perfusion and have been studied mostly in colonic resection. Its use in cases of rectal cancer with low rectal anastomosis still remained to be investigated.

Objective: The objective was to assess the impact of the use of fluorescence angiography ICG in patients undergoing a low anterior resection for rectal cancer. The main outcome was the rate of change in the surgical plan related to the site of proximal resection. Secondary outcomes were rates of anastomotic leak and post-operative complications.

Methods: All consecutive patients undergoing a low anterior resection for rectal cancer between August 2019 to September 2020 were included in the experimental group and ICG was used to help to choose the segment of bowel for the anastomosis. This cohort was compared with previous consecutive patients prior to the introduction of ICG technology.

Results: A total of 113 patients in each group were included. The use of ICG was associated with a change in the surgical plan in 10,6% (12/113) of cases. None of these patients developed an AL. There was a trend of lower AL rates (6.2% vs. 13.3%, p = 0.1146) in the ICG group. The ICG group was associated with a reduced length of stay (4,0 days vs. 10,0 days, p = 0,0164).

Conclusion: In cases of low colorectal anastomosis for rectal cancer, fluorescence angiography with ICG alters the surgical plan in a significant proportion of patients. It might possibly reduce the rate of anastomotic leak. Its use in this specific population should be considered.

P180

The Feasibility and Safety of Intracorporeal Anastomosis in the Single-Incision Laparoscopic Colectomy

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Background: Although intracorporeal anastomosis (ICA) is potentially beneficial to reduce mesenteric traction and the risk of twisting of mesenterium during anastomosis and to minimize the necessity of mobilization of colon as compared to extracorporeal anastomosis (ECA), the feasibility and safety in single-incision laparoscopic colectomy (SILC) is still unclear. This study aimed to clarify the feasibility and safety of ICA in SILC with preoperative chemical and mechanical preparation.

Methods: The study population included sixty consecutive patients (ICA, n = 22; ECA, n = 38) who underwent elective SILC between July 2019 and August 2021.

Results: No significant between-group difference was found in patient characteristics. Although no significantly difference was found in operation time (median 298 [IQR 246–369] vs 286 [231–346] min, respectively, P = 0.425)), anastomotic time was significantly longer in ICA (61 [51–69] vs 28 [26- 32] min, P < 0.001). The estimated blood loss was smaller in ICA (10 [9–30] vs 35 [10–83] g, P = 0.028) and final skin incision was shorter in ICA (30 [30–30] vs 30[30–50] cm, P = 0.011). No anastomotic leakage has been found in ICA group so far. Furthre, no significant between-group difference was found in the rate of organ surgical site infection (SSI) (4.6 vs 7.9%, P = 0.532), the first postoperative flatus (2 [1, 2] vs 2 [1, 2] days, P = 0.798), the first postoperative fecus (3 [2–4] vs 3 [2–4], P = 0.425), and length of stay after surgery (8 [7–9] vs 9 [8–11], P = 0.214).

Conclusion: Operation time in SILC was not significantly different between ICA and ECA, although anastomotic time of ICA was significantly longer than ECA. ICA was beneficial to reduce blood loss and skin incision length. The feasibility and safety of ICA in SILC was acceptable.

P181

Patient-Directed Ambulation After Colorectal Surgery Reduces Time to Bowel Function: A Pilot Randomized Control Trial

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Background: Although many surgeons recommend ambulation to hasten return of bowel function (ROBF), little evidence supports this practice. We conducted a pilot randomized control trial to determine the effect of early ambulation on ROBF after colorectal surgery. Our intervention was designed to be patient-centered and patient-driven. We hypothesized patients in the intervention arm would take more daily steps early postoperatively and would have faster ROBF.

Methods: Inclusion criteria for this study were adult patients undergoing colorectal resection. Exclusion criteria were emergent surgery, non-ambulatory patients, and those undergoing simultaneous resection of another organ. Consecutive patients were screened and approached for enrollment. All patients wore a wristwatch pedometer during the first 30 postoperative days (POD) and were randomized to either control (usual care, blinded to daily steps) or treatment (ability to track daily steps, recommended daily step goals) arms. Outcomes included daily steps taken each of the first three postoperative days, prospectively tracked time to ROBF and length of hospitalization.

Results: 36 consecutive patients were approached; 20 enrolled and 4 withdrew prior to surgery, leaving 16 patients included. Patients in both groups had similar baseline characteristics. There were more patients undergoing rectal resection as well as minimally invasive surgery in the control group, although these differences were not significant. Patients in the treatment group took more steps on POD1-3; this difference was significant on POD3 (median 1362 vs. 109 steps, p = 0.03). Time to ROBF was not significantly shorter (2 vs. 5 days, p = 0.10).

Conclusions: Interventions to reduce postoperative ileus are critical to improve outcomes after colorectal resection. Our results suggest that a protocol using a pedometer with daily goals may increase ambulation and improve outcomes.

Variable	Control (n=8)	Treatment (n=8)	p-value
Age	72 [51,74]	64 [58,65]	0.40
Male gender	8 (100)	6 (75)	0.45
BMI	30 [28,31]	28 [24,30]	0.37
Charlson Comorbidity Index	3 [0,4]	2 [1,2]	0.35
Baseline Duke Activity Status Index	36 [17,54]	49 [38,58]	0.26
ASA ≥3	7 (88)	6 (75)	>0.99
Minimally invasive	6 (75)	4 (50)	0.61
Operation			0.61
Right colectomy	4 (50)	5 (63)	
Left colectomy	2 (25)	3 (38)	
Rectal surgery	2 (25)	0 (0)	
Steps POD1	106 [0,499]	629 [314,1876]	0.13
Steps POD2	88 [55,786]	1086 [80,3290]	0.23
Steps POD3	109 [69,981]	1362 [480,4294]	0.03
Return of bowel function	5 [2,7]	2 [2,3]	0.10
Hospital length of stay	9 [6,19]	4 [4,5]	0.03

*Values expressed as n (%) or median [interquartile range].

P183

Significance of Laparoscopic Lateral Lymph Node Dissection in Extended Surgery for Rectal Cancer

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Background: Radical surgical resection is important for the treatment of local recurrence of rectal cancer. R0 resection often involves combined resection of surrounding organs. Laparoscopic surgery plays an extremely important role in making excision minimally invasive and minimizing the amount of bleeding, but it requires an understanding of anatomy and surgical techniques specific to extended surgery. Among them, lateral dissection plays an extremely important position.

Methods: From March 1998 to June 2021, 183 cases were enrolled. There were 64 cases of total pelvic exenteration and 18 cases of posterior pelvic exenteration. These cases were analyzed retrospectively.

Results: The average operation time was 631 min and the amount of bleeding was 2831 ml, although the surgical procedure varied widely and the operation time and bleeding amount were of little significance. The recurrence was local recurrence in 52 cases and distant recurrence in 83 cases (including duplication and R2 resection), and life was saved in about half of the cases. In recent years, he has succeeded in further reducing the amount of bleeding by applying laparoscopic surgery. When comparing the laparoscopic surgery group (n = 20) with the open surgery group (n = 37) limited to total pelvic exenteration, the average bleeding volume was significantly lower in the laparoscopic surgery group (735 vs 4447 ml, P). < 0.001).

Discussion and Points of Surgical Procedure: The most important reason for the small amount of bleeding in laparoscopic extended pelvic surgery is that the lateral dissection procedure has been standardized. Mastery and familiarity with lateral lymph node dissection is essential for intrapelvic extended surgery. Since the main trunk of the internal iliac artery can be an anatomical indicator that can show the positional relationship between the preoperative image and the lesion, we basically want to preserve it. However, for patients with positive lymph node metastasis around the Alcock Canal, major vascular resection was performed to ensure a sufficient margin for resection. In addition, combined resection of blood vessels optimizes the clearance of # 263 deepest lymph node metastases and recurrent lesions around the piriformis muscle. It can be said that this is an essential procedure even in cases of sacral resection.

P185

Perforated Stercoral Colitis in an Elderly Patient with Chronic Constipation

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Background: An uncommon sequela of fecal impaction and constipation is stercoral colitis, an inflammatory colitis caused by pressure on the colon wall by impacted stool. We present a case of an elderly female with constipation from opioid analgesics and immobility, which ultimately led to perforated viscus. Mortality rate ($\sim$ 35%) is remarkably high for patients who require surgery for perforated stercoral colitis, and prompt recognition and treatment is paramount to positive outcomes.

Case Presentation: This is an 82-year old female with no surgical history who presented to the emergency department complaining of abdominal pain and vomiting for two weeks. She came from her rehabilitation facility where she had been recovering from a scapula fracture one month prior, and was frequently taking opioid pain medications and developed progressive constipation. A CT scan of the abdomen and pelvis with intravenous contrast was obtained, and notable for free intraperitoneal air, constipation with rectal fecal impaction, and small ascites (Fig. 1). Cross-sectional imaging demonstrated perforated stercoral colitis, and she was emergently taken to the operating room for repair of perforation and creation of diverting colostomy.

Discussion: This patient had several risk factors for the development of severe constipation, including advanced age, hypothyroidism, and chronic opioid use after her scapula fracture. Her presenting symptoms were nonspecific, and CT scan was useful to secure the diagnosis. She was a good surgical candidate, and therefore expeditiously managed with surgery. Source control was achieved during the index operation, allowing for a quick functional recovery. This case illustrates the need for a high index of suspicion for stercoral colitis in a patient with constipation and abdominal pain, and shows that prompt diagnosis and surgical management of colonic perforation can lead to a positive outcome.

P186

Robotic Colorectal Surgery in the Emergent Setting: Is It Safe? A Review of Large National Database

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As the field of colon and rectal robotic surgery continues to advance in conjunction with improved recovery protocols, we have begun to implement robotic surgery as an option for emergent colorectal surgery. Our hospital system utilizes the Da Vinci Xi system and staff are required to undergo training, making emergent colorectal surgery a feasible option. However, it is essential to determine the safety with reproducibility of our experiences.

On retrospective review of national data, we have identified over 22,000 emergent colorectal surgeries. Of those, 544 were performed via a robotic surgery (RS) approach, while 3,856 underwent laparoscopic surgery (LS), and 17,849 were performed as open surgeries (OS). Though RS is associated with an increased average operating time (RS-239 min, LS-170 min, OS-167 min), the data has shown many pertinent benefits of emergent RS in comparison to OS. When comparing emergent colorectal RS to OS, we have found that there this a decreased overall length of stay (LOS) (OS-10.83 v RS-9.62 days) as well as decreased intensive care unit (ICU) admission (OS-33.97% v RS-15.07%) and decreased ICU LOS (OS-5.6 v RS-3.8 days). Furthermore, in emergent RS we identified a decreased rate of mortality (OS-7.96% v RS-2.57%), decreased rate of surgical site infection (OS-3.81% v RS-1.29%), decreased rate of anastomotic leak (OS-6.63% v RS-5.33%), and an overall decrease in cost of care (OS-$29,547 v RS-$24,785). When compared with emergent colorectal LS, RS has shown many comparable results. However, RS has shown that it is associated with a slight improvement in ICU admission rates (LS-16.18% v RS-15.07%), average ICU LOS (LS-4.2 v RS-3.8 days), rate of surgical site infections (LS-1.95% v RS-1.29%), and rate of anastomotic leak (LS-6.15% v RS-5.33%). Furthermore, when comparing emergent colorectal RS to LS, there is a striking difference in the rate of conversion to open surgery. LS has been associated with conversion to OS in over 36% of cases, whereas RS has only been associated with OS conversion in 8.09%.

Given these findings, we report that Minimally Invasive Surgery is safe for emergent colorectal cases when compared to open surgery. We also identified that the robotic approach has some benefits over laparoscopic surgery. We advocate that emergent robotic colorectal surgery is a safe option in the proper clinical setting, with a trained surgeon and appropriately trained staff.

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Chilaiditi Syndrome—A Rare Case-Report of an Adult Presentation with Non-Obstructive Abdominal Pain

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Background: Chilaiditi syndrome is a rare clinical entity defined by radiographic evidence of colonic interposition between liver and diaphragm, with associated symptoms and complications including chronic constipation, abdominal pain, cirrhosis, diaphragmatic paralysis, obstructive symptoms, and respiratory distress known as Chiladiti sign.1 It is thought to result from anatomic variations of colonic suspensory ligaments. Radiographically, the incidence of Chilaiditi sign is 0.025–0.28%.1 In asymptomatic patients, treatment is typically conservative involving bowel rest. Surgical intervention depends on both the portion of colon and complication involved.1 There is a growing sentiment to operate on non-obstructive symptomatic Chilaiditi syndrome, however there remains a paucity of adult literature on management.2

Case Presentation: We present a case of a 45-year old female with a one-year history of right upper quadrant (RUQ) abdominal pain. On day of admission, the patient reported persistent similar RUQ pain with a near syncopal event. The patient endorsed two weeks of dyspnea, orthopnea, and right lower extremity swelling. CT-AP was remarkable for colonic interposition anterior to the liver without obstruction or other acute abdominal pathology. Ultimately, her work-up was remarkable for UTI, pericardial effusion, and mild CHF exacerbation. The patient was admitted to medicine for further work-up and management. Surgery was involved in her care, but the patient no longer had abdominal pain, just abdominal fullness with distention. She was ultimately stabilized medically and discharged with a plan for outpatient follow-up. During her outpatient visit, she was with abdominal fullness and concerned that her intermittent pain would continue; therefore, a repeat CT-AP was ordered and surgical options were weighed, pending imaging studies.

Discussion: Chilaiditi syndrome is incredibly rare. There is no consensus on the surgical management of non-obstructive symptomatic Chilaiditi. As may be the case for this patient, the intermittent nature of pain may be due to periodic, positional obstruction that self-resolves once the interposed colon reverts back to its original position. Persistently symptomatic Chilaiditi syndrome may warrant surgical colopexy but limited data exists in adults.2 This patient is currently being managed conservatively with close monitoring of symptoms prior to definitive surgical intervention.

Keywords: Chilaiditi syndrome, management, surgical

P188

Jeffrey Dalli[1]; Jonathan P Epperlein[2]; Niall P Hardy[1]; Mohammad Faraz Khan[1]; Sergiy Zhuk[2]; Pol G Mac Aonghusa[2]; Ann Brannigan[3]; Jurgen Mulsow[3]; Ronan A Cahill[1]; [1]UCD Centre for Precision Surgery; [2]IBM Research Europe, Dublin, Ireland; [3]Department of Surgery, Mater Misericordiae University Hospital, Dublin, Ireland

Introduction: Beyond visual spectrum sensing surgical cameras have tooled surgeons with immediate bowel angiograms via indocyanine green (ICG), clinically applied to diminishing ischaemic anastomotic leakage (AL). However, accumulating evidence is stumbling to demonstrate benefits with recent trials failing prematurely. These unimpressive results may be attributed to the lack of practice standardisation, inter-user interpretation variability, discordant methods of signal sensing and visual representation and physio-optical artefactual phenomena.

While protocolisation is achievable, optimal interpretation of the dynamic fluorescence phenomena may exceed ocular capabilities necessitating digital support via Q-ICGFA (Quantitative-ICG Fluorescence Angiography). However, patient physiological fluctuations due to serum protein concentrations, body habitus, age, anaesthetic ventilation and overall circulation still negate us of a 'model' perfusion to compare to, hence the need for per-patient calibrated Q-ICGFA signature. We thus present a novel operative and computational practice of early intra-operative (prior to tissue vascular resection) ICGFA, allowing synthesis of a patient specific reference profile on which to base the later interrogation of pre-anastomotic perfusion (post-dissection and mesenteric preparation).

Methodology: Within a clinical trial (IRB 1/378/2092), consenting patients undergoing elective right and left sided colonic resection received early Control ICGFA (0.1 mg/kg intravenous ICG) immediately upon abdominal access and an Acquisition ICGFA following mesentery preparation utilising a commercially available laparoscopic stack (PINPOINT, Stryker). Post-hoc tracking and ICGFA intensity quantification was carried out using bespoke software (IBM Research) from selected regions of interest(ROI) on pre-anastomotic small and large bowel. The Control QICGFA was algorithmically translated into a Reference Profile r(t) which was then scaled(s) and time shifted(d) into agreement(square sum of the distance between the two curves) with the most distal optimally perfused ROI selected within 95% of the largest s value of the Acquisition video on the decrescendo perfusion gradient of the prepared bowel.

$$A(s,d) = \sum \left\{ l(t) - r\left(s(t-d)\right) \right\}^2$$

Results: This operative workflow was demonstrated to be deployable in left and right sided resections(n = 16) with no AL experienced within the cohort. Recording, tracking and quantification at 30 frames per second was achieved for all videos over a minimum of three minutes with postoperative analysis generating a total of 2.04 million data instances. Reference profiles were synthesised from 159 Control ROI and deployed to automatically select the most distal well perfused of 220 Acquisition ROIs on small(n = 4) and large bowel(n = 16).

Conclusion: The proposed clinical modus operandi allows feasible deployment of algorithmic personalised near-infra red bowel transection point recommendation, defeating user interpretation variability and fluorescence optical artefacts.

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When to Reconsider Minimally Invasive Surgery for Locally Advanced Colon Cancer

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Introduction: There is increasing evidence of the benefits for utilizing minimally invasive surgery (MIS) for locally advanced colon cancer; however, it is not clear when MIS should be avoided. The objective of this study is to clarify the impact of unplanned conversion to open surgery on short term outcomes for the resection of T4 colon cancer.

Methods: All patients who underwent MIS colectomy for T4 colon cancer between 2012 and 2019 were identified using targeted CPT codes and diagnosis codes within the National Surgical Quality Improvement Program. Patients with disseminated cancer, ventilator dependence, ascites, ASA class 5, emergency cases, preoperative renal failure, and sepsis were excluded. Procedures were grouped into MIS, and MIS with unplanned conversion to open surgery (converted). Demographics and postoperative variables were then compared. Multivariate regression models were generated for death and conversion to open surgery.

Results: A total of 5399 colectomies were evaluated, of which 4519 were completed as MIS and 880 were converted. The MIS group had higher rates of antibiotic bowel prep and robotic approach. The converted group had a higher rate of smoking, preoperative weight loss, non-elective status, bleeding disorders, wound class 4, and higher mean age. The converted cases compared to MIS had higher rates of death(OR = 2.97 $p < .001$), postoperative ileus (OR = 2.978, $p < .001$), wound infection (OR = 2.835, $p < .001$), pneumonia (OR = 2.670, $p < .001$), failure to wean from the ventilator (OR = 3.261, $p < .001$), stroke (OR = 2.779, $p = .033$), myocardial infarction (OR = 2.102, $p = .039$), bleeding (OR = 2.296, $p < .001$), deep venous thrombosis (OR = 2.244, $p = .005$), sepsis (OR = 2.604, $p < .001$), septic shock (OR = 3.421, $p < .001$), reoperation (OR = 1.503, $p = .021$), readmission (OR = 1.852, $p < .001$), anastomotic leak (OR = 2.536, $p < .001$) and increased operative time (173.55 ± 79.281 v 205 ± 91.319 min, $p < .001$), and length of stay(5.84 ± 5.144 v 8.82 ± 7.221 days, $p < .001$). The multivariate regression model showed that higher age (OR = 1.077, $p < .001$), Hispanic ethnicity (OR = 3.493, $p = 0.014$), CHF (OR = 9.954, $p < .001$), higher ASA classification (OR = 3.025, $p = 0.040$), antibiotic bowel prep (0.414, $p = .012$), and conversion (OR = 3.401, $p < .001$) were independent predictors for death. In a multivariate regression model, higher BMI (OR = 1.015, $p = .043$), smoking (OR = 1.383, $p = 0.019$), preoperative weight loss (OR = 1.4988, $p = .021$), elective cases (OR = 0.574, $p < .001$), stage T4b (OR = 3.070, $p < .001$), wound class 4 (OR = 5.666, $p < .001$), and robotic approach (Or = .487, $p < .001$) were all independent predictors for conversion.

Conclusions: Outcomes for resection of locally advanced colon cancer are worse after conversion. Patients with higher BMI, preoperative weight loss, non-elective surgeries, T4B tumors, higher wound classifications and smokers are at high risk for conversion to open.

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Short-Term and Oncological Outcomes After TaTME Based on Embryology for Rectal Cancer

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Aim: Multiple advantages via enhanced visualization of the dissection plane for transanal total mesorectum excision (TaTME) have been reported. However, the concerns of high rate of local recurrence and even more an unconventional multifocal pattern have been reported. The aim of this study was to evaluate the short-term and oncological outcomes of patients who underwent TaTME based on embryology for rectal cancer.

Methods: We evaluated prospectively collected data of 154 consecutive patients (mean age, 65.0 years; mean body mass index, 23.2 kg/m2) with rectal cancer who underwent TaTME based on embryology from November 2014 to June 2021. Intraoperative complications, blood loss, postoperative complications, length of hospital stay, pathological findings, and oncological outcomes were assessed.

Surgical Procedure: A double purse-string suture was applied in a clockwise manner using 0–0 polypropylene with a 26-mm rounded needle to tightly occlude the rectum with a 3-cm margin distal to the tumor, thus avoiding contamination by tumor cells and facilitating rectal transection. After irrigation with saline and marking of the dissection line by tattooing the rectal mucosa distal to the mucosal folds, mucosal dissection of the rectum was initiated. Full-thickness rectal transection was performed circumferentially. Dissection performed between endopelvic fascia and mesorectal fascia for posteriol wall; Denonvillier fascia and mesorectal fascia for anterior wall; the pelvic nerve and mesorectal fascia for both side wall with recognition of mobility between tissues of different embryological origins. The dissection proceeded toward the peritoneal reflex along the mesorectal fascia in a circumferential manner until connect to abdominal phase.

Results: A total of 56, 48, 27 and 23 patients underwent simultaneous open, laparoscopic or robotic low anterior resection, partial intersphincteric resection, abdominoperineal resection (APR) and Hartmann operation, respectively, including pelvic exenteration and lateral lymph nodes dissection. Intraoperative complications occurred in 12 patients. The mean operative time and amount of blood loss were 429 min and 260 g, respectively. Postoperative complications occurred in 52 patients., including 5 patients with Clavien Dindo classification grade IIIb. The mean length of hospital stay was 14 days. The mean number of retrieved lymph nodes was 16.4. The mean distal margin was 2.4 cm. Seven patients had radial margin positive. After a median follow-up of 36 months (4–82), local recurrence was identified in 5 (3.2%) patients, including 1 of multifocal recurrences.

Conclusions: TaTME based on embryology for rectal cancer was technically feasible and oncologically safe for patients with rectal cancer.

P192

Markedly Elevated Levels of PAI-1 in Wound Fluid After Colorectal Resection are Likely a Major Source of PAI-1 in the Plasma for Two Weeks After Surgery

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Introduction: Plasminogen activator inhibitor-1 (PAI-1), also known as Serpin 1, is an inhibitor of urokinase type plasminogen activator (uPA) and tissue-type plasminogen activators (tPA), which convert plasminogen to plasmin. PAI-1 as well as the plasminogen/plasmin system play an important roles in the regulation of extracellular matrix (ECM) remodeling, angiogenesis, wound healing, and tumor cell invasion. PAI-1 influences VEGF induced changes such as pericellular proteolysis that increases vascular permeability and supports endothelial cell proliferation and migration. PAI-1 over expression has been reported in colorectal cancer (CRC) patients. Persistently elevated plasma PAI-1 levels have been noted after CRC resection. We hypothesize that the healing wounds are a source of the added PAI-1 in the blood. This study's purpose is to determine perioperative PAI-1 levels in wound fluid (WF) and blood taken after CRC resection.

Method: The study population was CRC surgical resection patients (pts) enrolled in an IRB approved tissue/data bank for whom plasma and wound fluid samples were available. Demographic and clinical data were collected. Preoperative (preop) blood and postoperative blood and WF (collected via intraabdominal Jackson Pratt drains) samples were simultaneously obtained on postoperative day (POD) 1, 3, and between POD7-13 (for most pts). Samples were centrifuged and stored at -80 °C. Plasma PAI-1 levels were determined in duplicate via ELISA and reported as median and 95% CI. Mann Whitney and Wilcoxon signed rank tests were used for analysis (Significance $p < 0.05$).

Results: Plasma and WFL samples from 29 CRC patients (male: 12, female: 17; mean age 65.2 ± 11.4 years; colon 5, rectal 24) were studied. Laparoscopic (16 pts), hand assisted (9 pts) and open (4 pts) surgical methods were used (mean incision length (cm) for lap & hand, 8.2 ± 3.4; for open 23.8 ± 7.8). The mean length of stay was 9.6 ± 6.3 days. Postop plasma PAI-1 levels were significantly elevated ($p < 0.01$) over preop baseline at all time points (Table 1). In turn, WF PAI-1 levels were 3 to 4.4 times higher than the corresponding plasma levels at all timepoints ($p < 0.0001$)(Table 1).

Conclusion: After CRC resection, median plasma PAI-1 levels were 32 to 78% higher than preop levels ($p < 0.01$). Further, WF levels were 205–302% higher than the elevated postop plasma levels ($p < 0.0001$). These results support the hypothesis that the healing wounds, via diffusion along the concentration gradient, contribute to blood PAI-1 elevations. Although not addressed in this study, elevated plasma PAI-1, via several mechanisms, may promote the growth of residual tumor deposits after surgery.

Title: PAI-1 protein levels in preop and post op Plasma vs. postop Wound fluids

Time	Plasma (ng/ml)	(n)	Wound fluids (ng/ml)	(n)	*p*
PreOp	3.83; 95% CI: 3.4-5.2	29	N/A	N/A	N/A
POD1	6.82;95%CI: 4.97-9.34	29	27.16; 95%CI: 20.35-45. 31.5	28	< 0.0001
POD3	6.01;95%CI: 4.35-6.90	27	18.65;95%CI: 15.03-33.15	25	< 0.0001
POD 7-13	5.50;95%CI: 3.99-9.25	17	24.55;95%CI: 19.8-50.05	17	< 0.0001

P193

National Trends of Anastomotic Leak Rates Following Elective Laparoscopic and Robotic Colectomy: A NSQIP Analysis from 2012 to 2019

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Introduction: Anastomotic leak (AL) following colectomy is a feared complication. Our aim is to evaluate the recent trends in AL following laparoscopic and robotic surgery utilizing the National Surgical Quality Improvement Program(NSQIP).

Methods and Procedures: In a retrospective review of the NSQIP database from 2012–2019, our study included patients undergoing elective laparoscopic or robotic colectomy (CPT codes 44,204, 44,205, and 44,207). Open assisted and hand assisted were included. Patients with ileostomy or colostomy were excluded. 30-day AL was evaluated over time.

Results: A total of 123,254 patients (52.3% female, age 61 ± 14.2) underwent laparoscopic and robotic colorectal resection. 3,076 (2.5%) patients had AL within 30 days. The overall AL rate significantly decreased from 2.9% in 2012 to 2.3% in 2019(P = 0.006). Laparoscopic colectomy with low pelvic anastomosis leak rates decreased significantly from 4% in 2012 to 2.5% in 2019(P = 0.008). There was no significant change in the trend of AL rates among right colectomies, other partial colectomies, and robotic colectomies. AL were managed with reoperation (56.7%), non-operative interventions (21.1%), and no interventions (22.2%). AL management did not significantly change over time.

Conclusion(s): National AL rates after elective laparoscopic colectomy have decreased from 2012 to 2019. Specifically, leak rates after laparoscopic colectomy with low pelvic anastomosis have decreased the most when compared to other types of colon resection. Leak rates among patients who underwent robotic colectomy were similar from 2012–2019.

National Trends of Leak after Elective Laparoscopic Colectomy

Year	2012–2013	2014–2015	2016–2017	2018–2019
Total Leak Rate*	2.7%	2.7%	2.4%	2.3%
Management				
Requiring Reoperation	1.6%	1.6%	1.4	1.3%
Non-Operative Intervention	0.7%	0.6%	0.6%	0.5%
No Intervention Needed	0.6%	0.6%	0.6%	0.6%
Laparoscopic Procedure				
Partial Colectomy	2.4%	2.8%	2.3%	2.3%
Right Colectomy	2.7%	2.1%	2.2%	2.0%
Partial Colectomy with Low Pelvic Anastomosis*	3.8%	3.1%	2.9%	2.6%

*P < 0.05

P194

Significantly Elevated Plasma MMP-8 Levels are Present for 2 Weeks After Colorectal Cancer Resection and May be Related to the Wounds Which have MMP-8 Levels that are 11–57 times Higher

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Introduction: Matrix metalloproteinase 8 (MMP-8), is a protease that breaks down the extracellular matrix (ECM) and plays key roles in tissue remodeling and wound healing. MMP-8 also facilitates cancer growth by promoting invasion and via regulation of growth signaling, angiogenesis and immune responses. MMP-8 expression has been noted in a variety of cell types (macrophages, fibroblasts, etc.) as well as in many cancers. Elevated blood levels have been noted in colorectal cancer (CRC) patients and significantly elevated plasma MMP-8 levels were noted for a month after CRC resection. We hypothesize that the healing wound may be a source of MMP-8 to the bloodstream. This study's aim was to measure perioperative MMP-8 levels in blood and wound fluid (WF) samples obtained after CRC resection.

Methods: CRC patients (pts) who consented to have blood and wound fluid samples taken for an IRB approved tissue/data bank were eligible. Demographic and clinical data were collected. Preoperative (preop) blood samples as well as postoperative (postop) blood samples and WF samples (from intra-abdominal Jackson Pratt (JP) drains) were obtained on postop day (POD) 1, 3, and between POD 7–13 for most patients. Samples were centrifuged and stored at -80 °C. Plasma MMP-8 levels were determined in duplicate via ELISA and reported as median and 95% CI. Mann Whitney and Wilcoxon signed rank tests were used for analysis (significance $p < 0.05$).

Results: A total of 27 CRC pts (male 11, female, 16; colon 4, rectal 23; mean age 66.3 ± 12.7) for whom plasma and WF samples were available were studied. Surgical methods used were laparoscopic (15 pts, incision length (IL) 8.3 ± 3.5 cm); hand assisted (8 pts, IL: 14.5 ± 9.0), and open (4 pts, IL: 23.7 ± 7.8). When compared to preop baseline levels, plasma MMP-8 levels were found to be significantly elevated on POD 1 ($p < 0.001$), POD 3($P < 0.001$), and POD 7–13 (P = 0.01) (Table 1). Also, WF MMP-8 levels were noted to be many times higher than the elevated plasma levels at all 3 postop time points ($p < 0.001$) (Table 1).

Conclusion: After CRC resection plasma MMP-8 levels were found to be significantly elevated over median preop levels; levels were 2- 5 times higher than baseline. In turn, WF levels were 11 to 57 times higher than plasma levels on the same day. These results support the hypothesis that the healing wounds are a source of MMP-8 that likely diffuses into the blood along the concentration gradient. Elevated plasma MMP-8 may promote tumor growth after surgery.

Table 1: Title: MMP8 protein levels in preop and post op Plasma vs. postop Wound fluids

Time	Plasma (ng/ml)	(n)	Wound fluids (ng/ml)	(n)	*p*
PreOp	5.59; 95% CI:2.99-8.23	27	N/A	N/A	N/A
POD1	16.82;95%CI:8.03-27.26	27	876.7; 95%CI: 511.3-45. 1952.7	26	< 0.0001
POD3	26.65;95%CI:11.42-45.52	26	286.8;95%CI: 180.5-652.7	24	< 0.0001
POD 7-13	11.11;95%CI: 5.82-20.91	16	328.1;95%CI: 121.2-1819.8	16	< 0.0001

P195

Laparoscopic Hartmann's Procedure is a Safe and Effective Alternative for Emergent Surgical Management of Complicated Diverticulitis: A NSQIP-Based, Propensity Score Matched Analysis Study

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Introduction: Acute colonic diverticulitis is a common surgical condition, and as many as 25% of patients will present with complicated disease. The procedure of choice for emergent management of complicated diverticulitis has been the open Hartmann's procedure. We analyzed the NSQIP database to compare outcomes in patients who underwent emergent laparoscopic Hartmann's procedure for complicated diverticulitis to those who had an Open Hartmann's procedure.

Methods: Data analyzed was from the ACS-NSQIP database. We identified patients with complicated colonic diverticulitis using ICD-10 codes, and who required either a laparoscopic or open Hartmann's procedure from 2010—2019. Propensity score method (PSM) was utilized to match patients in each of the two surgical groups on a number of important covariates.

Results: Prior to PSM analysis, 4,570 patients had an open Hartmann's procedure, while 456 had laparoscopic Hartmann's procedure. PSM analysis yielded 374 open Hartmann's and 347 laparoscopic Hartmann's patients. Laparoscopic Hartmann's patients had similar post-operative outcomes when compared to open, including; Mortality (5.08% vs. 4.55%, $p < 0.8642$), wound disruption (1.34% vs. 1.6%, $p < 1.000$), SSSI (2.41% vs. 5.35%, $p < 0.0614$), median LOS (10.5 d vs. 10.6 d, $p < 0.9630$), any readmission within 30 days (11.76% vs. 9.63%, $p < 0.4282$). Laparoscopic Hartmann's procedures were longer compared to open, (Median procedure time; 129 m vs. 116.5 m, $p < 0.0001$).

Conclusion: Laparoscopic Hartmann's procedure is a safe and effective alternative to open Hartmann's procedure for emergent surgical management of complicated diverticulitis. More studies are needed to determine differences in long-term outcomes between these two procedures.

P196

The Impact of Insurance Status on Adjuvant Chemotherapy Compliance in Early Onset Colon Cancer: A National Cancer Database Analysis

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Background: Adjuvant chemotherapy is the standard of care in stage III colon cancer, with proven reduced recurrence and improved overall survival (OS). Despite evidence, there are reports of low compliance with chemotherapy. Thus, determining factors that impact compliance is important. Compliance is more critical in early onset colorectal cancers (< 50-years-old) where cases present often as advanced disease, in a population theoretically fit for chemotherapy. Insurance status, a socio-economic determinant, is an easily identified variable that may impact the compliance. Our goal was to determine the relationship and impact of insurance status on adjuvant chemotherapy compliance in early onset stage III colon cancer.

Methods: The National Cancer Database was reviewed for all stage III colon adenocarcinomas in patients 18–50-years-old, who underwent curative surgical resection from 2004 through 2017. Cases were stratified into adjuvant chemotherapy and no adjuvant chemotherapy cohorts. Multivariate logistic regression was performed for factors associated with adjuvant chemotherapy compliance. Multivariable Poisson regression assessed time from diagnosis to adjuvant chemotherapy. Kaplan Meier and Cox regression assessed OS. The primary outcomes were the relationship between insurance status and adjuvant chemotherapy compliance and OS in early onset stage III colon cancer.

Results: Among 13,897 cases included, 91.2% (n = 12,686) received adjuvant chemotherapy. Private insurance patients had higher compliance with adjuvant chemotherapy compared to Medicaid/Medicare [OR 0.532 (0.457–0.620); $p < 0.001$] and uninsured [OR 0.455 (0.380–0.545); $p < 0.001$]; private and other governmental insurance [OR 0.663 (0.417–1.054); 0.082] had similar compliance. Medicaid/Medicare had 20% longer mean time from diagnosis to start of adjuvant chemotherapy [75.6 days, IRR 1.201 (1.195–1.210), $p < 0.001$] than private insurance (62.9 days), and the uninsured had 11% longer mean time to chemotherapy [69.6 days, IRR 1.107 (1.098–1.116); $p < 0.001$]. Other governmental and private insurance had similar times from diagnosis to chemotherapy (61.9 days, IRR 0.984 (0.964–1.004); $p = 0.122$]. In adjusted Cox regression, Medicaid/Medicare [HR 1.790 (1.630–1.966); $p < 0.001$] and the uninsured [HR 1.353 (1.195–1.531); $p < 0.001$] had worse OS, compared to private insurance. Other governmental and private insurance had similar OS [HR 0.769 (0.525–1.126); $p = 0.177$].

Conclusion: Other governmental rivaled private insurance outcomes for compliance with adjuvant chemotherapy, time to start adjuvant chemotherapy and OS in early onset stage III colon cancer. Medicare/Medicaid and uninsured patients had worse compliance and longer delays to start adjuvant chemotherapy, as well as inferior OS. These findings highlight advantages of governmental programs for cancer care, and present an opportunity for governmental cancer care to serve as a model all federal programs.

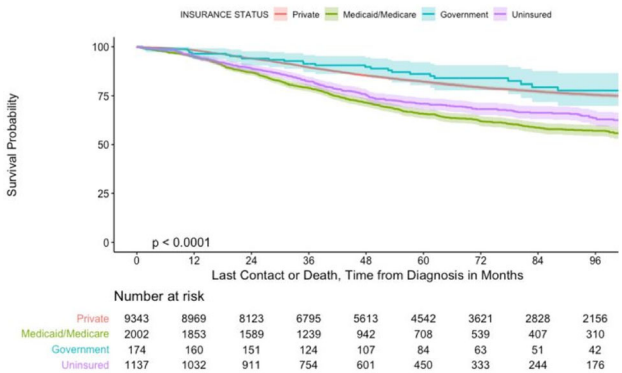

Figure 1. Kaplan Meier for Overall Survival of Stage III colon cancer patients, from 18 to 50-year-old, stratified by Insurance Status, with 95% confidence interval (shaded area). P-value for the Log-rank test. Private insurance (health maintenance organization [HMO], preferred provider organization [PPO], managed care, private insurance, Tricare/CHAMPUS, and insured NOS), Medicaid/Medicare, Government (other government funded plans as Department of Veteran Affairs, Indian Health Service, Public Health Service, welfare, state- and federally-funded NOS), and uninsured (not insured, charity write-off, and self-pay).

P198

Local Excision in the Treatment of T2-3 Rectal Cancer After Neoadjuvant Therapy

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Background: Local excision (LE) of advanced rectal cancers with curative intent remains a debatable issue. Several studies have described that LE is safe and effective for patients with low risk rectal carcinoma cT2N0 after chemoradiotherapy (CRT) with downstaging tumor and cT3N0 with complete clinical response (cCR) after CRT.

Aims: To assess the surgical and long-term oncological outcomes of LE for the treatment in T2-3 rectal cancer after CRT.

Methods: This study was a retrospective review of a prospective database of patients with T2-3 rectal cancer that underwent LE after CRT from October 2010 to September 2020.

Results: 78 patients underwent LE during a period of 10 years (45 female, 33 male, mean age 62), 21 patients with T2 downstaging and downsizing tumor and 57 patients with T2-3 cCR. The median lesion size was 2,6 (1–4) cm and lesion distance from the anal verge 7,3 (4–10) cm. Median operative time was 72 min and hospital stay was 21 h. Morbidity rate was 9% and serious complications (Clavien–Dindo grade III) was 3,8%. In cCR group, 44 patients (ypT0, ypT1) were followed up while 13 (ypT2, ypT3) were performed radical salvage surgery. In T2 without cCR group 9,5% (2/21) patients had local recurrence while in T2-3 cCR group 2,3% (1/44) with 6,8% of distant metastases. The 5-year disease-free survival was 92,3% and 5-year overall survival 91,2%.

Conclusion: Our experience has shown that performing LE to treat T2-3N0 rectal cancer with cCR after CRT, appears to be an oncologically safe and effective procedure.

P199

Necrotizing Fasciitis of the Lower Extremities Following Perforation of Mixed Adenoneuroendocrine Carcinoma of the Cecum

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Necrotizing fasciitis is a rare infection of the fascia leading to tissue necrosis. Association with cecal cancer is rare and requires prompt diagnosis and treatment

49 year old male with history of a Stage IV mixed adenoneuroendocrine carcinoma of the cecum who recently completed chemo therapy presented to the emergency room with symptoms of increasing right sided abdominal pain, nausea, and vomiting over the prior 24 h. On exam, the patient appeared peritoneal with fever and increasing white count. A chest x-ray did not show pneumoperitoneum, but the patient's exam was concerning for peroration and intervention was deemed necessary. Of note, the patient did complain of pain in his leg that he attributed to a recent workout. A right colectomy with end ileostomy was performed without complications. Following the operation, the patient complained of worsening pain in his lower extremities, right worse than left. On exam, the patient was noted to have erythema that progressively worsened down the right side of his leg following the IT band. A CT of the lower extremities showed air in the soft tissues of the right buttock dissecting along the fascia to the posterior thigh on the right and air in the gluteus Maximus and medius of the left. Orthopedic surgery was consulted for incision and drainage. Purulent material was found in the areas of concern seen on CT with the right side being the most involved. Cultures were positive for clostridium. The patient had multiple further washouts and debridements for his right leg during his stay. He was discharged to rehab, but returned about two weeks later to the ER for severe leg pain and mental status change. CT was performed which once again showed concern for necrotizing fasciitis and abscess collections. He was transferred to a tertiary center for further urgent intervention. The patient passed away from complications of his acute condition after his transfer. Upon literature review, few cases of necrotizing fasciitis are reported in conjunction with an ascending colon cancer.

Complication of necrotizing fasciitis following perforated cecal cancer is rare. This case highlights the necessity of quick recognition of symptoms and prompt treatment to prevent further spread of the infection.

P200

Stomal Prolapse in Patients with a Transverse Loop Colostomy for Colorectal Cancer

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Objectives: In cases of colorectal cancer obstruction, difficulty in resecting the primary lesion, or poor general condition, colorectal colostomy is often performed as a palliative surgery. Stomal prolapse is one of the relatively common complications encountered after colostomy. It is rarely relieved conservatively, and the management of the prolapsed bowel is often difficult, which significantly reduces the quality of life of the patient. Furthermore, surgical treatment may be necessary in cases of intractable bleeding due to prolapse of the prolapsed colon. In this study, we investigated stomal prolapse in patients with a transverse loop colostomy for colorectal cancer experienced at our hospital.

Patients and Methods: 233 patients who underwent a transverse loop colostomy for colorectal cancer during the 10-year period from January 2010 to December 2019. The age, sex, duration of occurrence, prophylaxis of stomal prolapse, and complications in these cases were studied retrospectively.

Result: Of the 233 patients with colorectal cancer who underwent transverse colon twin-hole colostomy at our hospital, 45 (19%) had colostomy prolapse, of which 29 (64%) had prolapse on the anal side, 12 (27%) on the oral side, and 4 (9%) bilaterally. There were 33 male patients (73%), mean age 65.1 (39–90) years, and mean BMI 21.3 (16.6–28). Stoma site hernia was present in 6 (13%) patients and peristomal dermatitis in 4 (9%) patients. In a comparative study with the non-prolapse group, there were no significant differences in gender, age, BMI, primary site, reason for construction, operative time, or colostomy complications. In our institution, fixation of the elevated intestine between each other or between the abdominal wall and the elevated intestine is sometimes performed to prevent stomal prolapse, but no significant difference in the frequency of occurrence was observed.

Conclusions: From the present study, we could not identify any factors involved in the development of colostomy prolapse. It is important to maintain the quality of life in patients with unresectable colorectal cancer and terminal colorectal cancer, and we believe that further studies are needed to prevent colorectal prolapse, including intraoperative manipulation.

P201

Metastatic Renal Cell Carcinoma Masquerading as Hemorrhoids: A Case Report

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Metastatic clear cell renal cell carcinoma to the anal canal is exceedingly rare, with only 8 previously reported cases worldwide. We report a case of an 88 year-old female who was referred to surgery with chief complaint of bleeding external hemorrhoids. Her past medical history was significant for renal cell cancer status post left-sided radical nephrectomy in 2014 complicated by partially obstructing metastases to sigmoid colon requiring diverting colostomy. She subsequently presented to ED in 2018 with chief complaint of bright red blood per rectum and was sent to our outpatient clinic for further follow-up due to concern for bleeding hemorrhoids. On examination she was noted to have a large (approximately 4–5 cm) pedunculated anal mass with evidence of necrosis, raising concern for anal carcinoma. She was taken to the OR for resection of peri-anal mass. Final pathology determined that the mass was metastatic clear cell renal carcinoma. To our knowledge this is only the ninth reported case of renal carcinoma with metastasis to the anal canal.

P202

Iatrogenic Colorectal Anastomotic Leak Model in Swine for Studies Related to Early Diagnosis of Complications

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Introduction: Colorectal anastomotic leakage (CAL) is a devastating postoperative complication that significantly increases morbidity, mortality, and leads to poorer oncological outcomes. Current animal models for studying CAL depend on creating an anastomotic insufficiency intraoperatively. This can be limiting when evaluating novel diagnostic modalities for early detection of CAL since exact time of leak onset cannot be controlled.

Materials and Methods: 17 Yorkshire pigs were split into 2 cohorts (11 experimental/leaks and 6 controls). An enterotomy was performed on the descending colon and an end-to-end handsewn anastomosis was created for both groups. Proximal and distal ends of the suture were exteriorized and held in place using an external plastic tube. The plastic tube was pulled creating an anastomotic insufficiency in the experimental group 3–4 h following the surgical procedure. The endpoints of the study include behavioral changes (activity level, food and fluid intake, and defecation pattern), vital assessments, and laboratory indicators of CAL. An exploratory re-laparotomy was conducted to identify macroscopic signs of CAL such as visible rupture of anastomosis, leakage, and fecal peritonitis within the abdominal cavity and followed by euthanasia. Samples of blood were drawn at the time of initial and exploratory laparotomy.

Results: This animal model of CAL was successfully established in 72.7% (8/11) of the leak cohort animals. These animals displayed behavioural indicators of illness, including lethargy, loss of appetite, and discomfort. Leakage was confirmed during the exploratory relaparotomy where 63.6% of the experimental pigs showed complete anastomotic rupture and 9.1% showed partial rupture of the suture line. Additionally, fecal peritonitis and enteric spillage were observed macroscopically within the abdomen of successful leak models confirming the presence of CAL. Reasons for model failure within this cohort include closure of the anastomosis due to adhesions or tamponading by the abdominal wall/liver. None of the control cohort had symptoms of CAL, fecal peritonitis, or enteric spillage. Whereas, clinical and laboratory indicators, including vital signs, blood lactate, blood potassium, and white blood cell count did not yield significant results between the control and leak group. The mean days until relaparotomy were 1.4 for leak group and 3.6 for control group ($p = 0.005$) due to early symptom onset.

Conclusion: This animal model allows the researcher to control the time of leak onset, and results in rapid CAL development. This model is suitable for studies evaluating novel diagnostic methods focusing on early detection.

P205

Intestinal Perforation in a Severe COVID-19 Patient: A Rare Complication

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Since the emergence of SARS – CoV-2, several atypical abdominal conditions have been presented. Although the virus presents primarily as a lower respiratory tract infection, there are multiple gastrointestinal manifestations of the disease. In some cases, these symptoms can be the initial presentation or even the only manifestation of COVID-1. Among the most reported intestinal symptoms, we found diarrhea and loss of appetite as the most common. Other symptoms already mentioned include nausea, vomiting, abdominal pain and increased transaminases. The Authors will present a case of Acute Vascular Abdomen in a patient hospitalized after a confirmed diagnosis of COVID-19 by RT-PCR. Patient AO, 48 years old, male, obese and hypertensive, was admitted with acute, febrile, tachycardic respiratory failure, SATO2 75%, starting intensive support.

Developed nephropathy related to COVID 19, requiring dialysis. On the 7th day of hospitalization, he presented pneumoperitoneum associated with abdominal distension on routine X-ray.

Patient submitted to exploratory laparotomy, identifying perforation of the ascending colon of about 1 cm with stool discharge. Performed right colectomy and enterectomy of the terminal ileum with ileostomy, presented good evolution.

Several mechanisms that justify intestinal involvement have been proposed in addition to infection and direct damage to the mucosal epithelium, such as hypotension and vasculitis due to the state of systemic shock, microbiota disarrangement due to the blockage of amino acid transport mentioned above, or a hyperresponsiveness of the extensive intestinal lymphoid tissue to the disease-related cytokine storm). We agree with (H.M.A. Kaafarani et al. 2020) that viral enteroneuropathy and SARS-CoV-2 induced small vessel thrombosis are two possible hypotheses that warrant further investigation). The latter gains space when we evaluate the only other publication of our knowledge regarding ischemia with intestinal perforation (Bianco et al. 2020) whose patient, in a scenario very similar to ours, also presented a significant increase in D-Dimer (30x) and ischemia of a small segment of the small intestine.

Cases like this reinforce the importance and need for further studies to assess the real impact of viral infection on gastrointestinal system, since most studies still focus exclusively on the respiratory symptoms of the disease.

P206

A Late Presentation of COVID-19 Induced Bowel Ischemia

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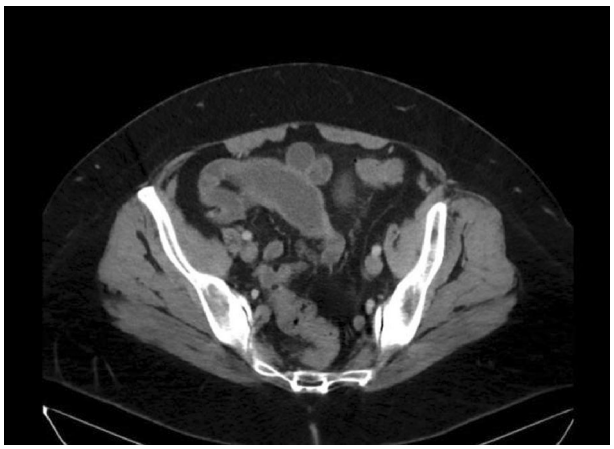

Introduction: COVID-19 has systemic effects besides the pulmonary manifestations that are the hallmark of infection. There have been multiple reports in the medical literature documenting bowel ischemia and especially superior mesenteric thrombosis. These reports describe acute thrombosis secondary to COVID-19 but there is a lack of data on the chronic effects of the disease. We report a case of late presentation of bowel ischemia and stricture in a patient with a history of COVID-19.

Case Presentation: A 55-year-old female contracted COVID-19 infection in June 2020. She did not require hospitalization. She had no loss of taste or smell, and no respiratory symptoms. During quarantine from her Covid-19 positive test, the patient developed intermittent melena without abdominal pain. This persisted for several months. She underwent upper endoscopy and colonoscopy were normal. The patient was admitted to acute care facility June 2021 with crampy abdominal pain mostly epigastric and RUQ. The patient underwent uneventful laparoscopic cholecystectomy.

Unfortunately, the patients' symptoms recurred and progressed. She was admitted to an acute care facility 3 times in one month for recurrent partial SBO. She was managed each time non-operatively. She reported a 40 lb. weight loss in 2 months. In July 2021 she again underwent upper endoscopy and lower endoscopy. Of note the terminal ileum was intubated and about 30 cm distal small bowel was examined and found to be grossly and pathologically normal. Patient was discharged home with resolution of symptoms.

The patient was than given a "dummy" capsule in preparation for possible formal capsule endoscopy. Serial abdominal x-rays demonstrated failure of the capsule to traverse the small bowel into the colon and eventual dissolution. Patient was admitted to acute care facility August 10 with increasing abdominal pain, episodes of emesis, and oral intolerance for 3 days. Computed tomography confirmed recurrent partial small bowel obstruction.

On August 10, the patient underwent laparoscopic with hand assisted segmental small bowel resection (12 cm ileus). The patient recovered well postoperatively. Grossly, at time of surgical intervention it appeared the patient had a benign isolated small bowel stricture. Pathology revealed a 1.5 X 1.5 cm benign ulceration with active inflammation.

Conclusion: COVID-19 can also present as chronic mesenteric ischemia, leading to small bowel stricture and ischemia. Surgeons should be aware of the chronic bowel manifestations of COVID-19 as well as acute mesenteric ischemia.

P207

The Impact of the Covid-19 Pandemic on Surgical Fellowship Applications

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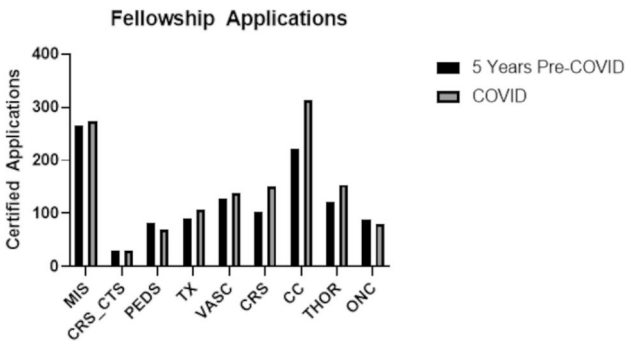
Background: Most graduating US and Canadian surgery residents seek additional fellowship training. We aim to analyze the impact of the COVID-19 pandemic on the number of surgery fellowship applicants and match rates. We further hypothesize that during an uncertain job market, there is increased resident desire to pursue additional training.

Methods: Publicly available match statistics from the National Resident Matching Program, Residency and Fellowship of Matching Services (SF Match), and Fellowship Council between 2015 to 2021 for the surgical specialties of Advanced Minimally Invasive Surgery, non-ACGME Colorectal and Thoracic, Pediatric, Transplant, Vascular, Colorectal, Critical Care, Thoracic, and Oncology were analyzed.

Results: The yearly average total certified applications to surgical fellowships in the 5 years leading up to the COVID-19 pandemic was 1157 ± 52. In the application cycle during the pandemic, this number increased 14% to 1316 ($p < 0.05$). Critical Care had a 42% increase in applicants (221 vs 314). Pediatric Surgery (-16%) and Oncology (-11%) were the only specialties to see a decrease in applicants. The median percent increase in applicants was 16% (range: 3%—42%). All specialties had increased match rates except for non-ACGME Colorectal and Thoracic (-3.9%), Vascular (-3.8%), Colorectal (-5.6%), Critical Care (-6.3%), and Thoracic (-15.3%). Advanced Minimally Invasive Surgery, which traditionally has the highest number of applicants, had a 3% increase in applicants and a 5.3% increased match rate. The total number of positions available during the pandemic increased to 1000 from an average of 949 ± 34. There was a reduction in unfilled positions in all programs except for Oncology (n = 3, 8.3%).

Conclusion: During the COVID-19 pandemic, there was an increase in applications for surgical fellowships, with the greatest increase in Surgical Critical Care. Abdominal and gastrointestinal surgical specialties had higher match rates. Match rates were lower for non-ACGME Colorectal and Thoracic, Vascular, Colorectal, Critical Care and Thoracic. Reasons for these observations are unclear, and likely cannot be explained solely by the pandemic.

Fig. 1 Total applicants per specialty prior to and during the COVID-19 pandemic. MIS, Minimally Invasive Surgery; CRS_CTS, Advanced Colorectal and Thoracic Surgery; PEDS, Pediatric Surgery; TX, Transplant Surgery; VASC, Vascular Surgery; CRS, Colorectal Surgery; CC, Surgical Critical Care; THOR, Thoracic Surgery; ONC, Surgical Oncology



P208

Transthoracic Esophagectomy with no Postoperative ICU Stay During Covid-19 Pandemic: Feasibility and Results

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Aim: The Covid-19 pandemic has led to hospital conversion and significant reduction of elective surgery, with oncologic patients shifted to dedicated HUBs. In this scenario, the hypothesis of managing the post-operative course of patients undergoing major operations without ICU support has taken place. We evaluated the post-operative course of 10 consecutive patients undergoing hybrid Ivor-Lewis esophagectomy and transferred to a dedicated ward immediately after surgery.

Materials and Methods: All patients were extubated and stabilized in the OR, then transferred to the ward maintaining a radial arterial access. Analgesic control was granted by both a TAP (Transverse Abdominal Plane) and a SAP (Serratus Anterior Plane) block performed, respectively, before the laparoscopy and the thoracotomy. A perifascial catether was left in the thoracotomy wond. During the first 24 h the patient was taken in charge by a dedicated nurse and a surgical resident. A senior surgeon and an anesthesiologist were on-call in the hospital. In addition to the traditional monitoring methods we used the non-invasive doppler USCOM 1A (Uscom Ltd, Sydney, Australia) which evaluates cardiac output, systemic vascular resistance, and patient's response to fluids and drugs infusion.

Results: Mean age of patients was 67 (range 55–77) years, mean duration of surgery was 313 min (SD: 26,3), mean duration of monitored hospitalization was 24,4 h (SD: 6,4). Vital signs were stable in 100% of cases, as well as diuresis (> 50 ml/h) and pain control (VAS < 4). No patients was transferred to the ICU. USCOM changed the therapeutic approach in 6 patients; in 4 cases fluid infusion was implemented, in 2 diuresis was stimulated. The post-operative course was uneventful in all patients, with removal of the perifascial catether on POD IV and progressive reintroduction of oral diet. Post-operative morbility was 20% (1 case of delayed gastric empting and 1 pneumothorax, both treated conservatively).

Conclusions: Post-operative ICU stay can be avoided in selected oncologic patients undergoing transthoracic esophagectomy. Preemptive analgesia, rigorous surgical technique, careful anesthesiologic management, and the availability of a multidisciplinary team, and non-invasive monitoring equipment are the essential prerequisites for ensuring optimal outcomes.

P209

Increasing D-Dimer Values and Mesenteric Ischemia Complications in Critical Ill Covid Patients

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Introduction: A well documented complication of COVID 19 infection is an inflammatory hypercoagulable state. One significant sequel can include mesenteric ischemia. Both large vessel thrombosis and small vessel microthrombi have been documented in the literature. Critically ill COVID patients pose a particular diagnostic challenge as they are often ventilated, sedated and paralyzed. Prophylactic therapeutic anticoagulation remains high risk with many bleeding complications and adverse outcomes. However, mesenteric ischemia is often diagnosed late in these patients with devastating consequences.

Methods & Procedures: Between June 2021 and September 2021 four patients were operated on emergently for acute mesenteric ischemia. All patients were already admitted to the intensive care unit, ventilated with COVID pneumonia. Observational retrospective data was collected.

Results: From June 2021 to September 2021, 22 patients were admitted to the intensive care unit with COVID-19 pneumonia as a primary diagnosis, requiring mechanical ventilation. Four patients were diagnosed with acute mesenteric ischemia requiring emergent surgical intervention. The average age was 56 years old, all were male and hypertension was the most common co-morbidity. All patients had elevated D-Dimers upon admission, average 1.89 (1.26, 1.49, 2.05, 2.47). Three of 4 patients had admission imaging to evaluate for thrombosis (Duplex US LE or CT-angiography) of which all were negative. Patients developed mesenteric ischemia on hospital day 4, 7, 11 and 16. Three of 4 patients had repeat D-Dimer level the day before surgery, all of which demonstrated an increase relative to admission values (4.26, n/a, 3.61, > 20.0). No patient was on therapeutic anticoagulation at the time of diagnosis. One patient was diagnosed with SMA thrombus with ischemia of right colon, jejunum and ileum (D-dimer > 20.0). Two patients demonstrated patient ischemia of jejunum and ileum (D-Dimer 4.26, 3.61). The fourth patient demonstrated ischemia of the ileum and right colon. One patient died of Covid complications, while 3 others were discharged to skilled nursing facilities.

Conclusions: As knowledge of COVID-19 rapidly accelerates, the diagnosis of mesenteric ischemia in critically-ill patients remains difficult. Serial D-dimer values in addition to other diagnostic methods may assist in the detection of mesenteric ischemia in mechanically ventilated COVID-19 patients.

P210

The Impact of the COVID-19 Pandemic on the Length of Stay in Elective Laparoscopic or Hand Assisted Colectomy

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Introduction: The COVID-19 pandemic has significantlyimpactedhealthcare systems,leadingmany hospitalstoimplementcontinuously changing policiestolimit the spread of COVID-19.The goal of this studywastoevaluateany difference inlength of stay(LOS)that may existforpatientsundergoingelectivelaparoscopic or hand assisted colectomybefore and during the COVID-19 pandemic.Due tostrict visitor policies, widespread concern for hospital-acquired COVID-19andsignificant system wide pressurescaused by the COVID-19pandemic,it was hypothesized that post-COVID patients would have decreasedLOS.

Methods and Procedures: Patientswho underwentelectivelaparoscopic or hand assisted colectomybetween2015 and 2020 were reviewed retrospectively. Patientswere evaluated for factors associated with LOSincluding comorbiditiesand postoperativecomplications.Post-COVID admissions were defined as those after March 1, 2020.LOS was categorizedintoadmissions < 5 daysor ≥ 5 days. Variables were evaluated for association with LOS by Chi-square or Student's t test asappropriate. Variables with $p < 0.200$ after univariate analysis were considered for inclusion in multivariate logistic regression modeling.

Results: A total of 258 patients were included in the studywith 55 patients defined as post-COVID patients.Race was divided into white and non-white categories with 129 patientsof each race.Significant differences in mean income and distance > 50 miles from the hospital were found between white and non-white patients, but no LOS differencewasidentifiedwhen stratified by race.Patients who developed any postoperative complication hadsignificantlyincreasedLOS byboth univariate and multivariate analysis.No significantdifferencein LOSwas foundbetween pre-COVID andpost-COVID patients(Table 1).There were 27 post-COVID patientsthat were unable to have visitors during their hospitalization due to hospital policy, however no significant differencein LOSwas found as compared to post-COVID patients that were allowed visitors.

Conclusions: It was hypothesized thatpatientswho underwentelectivelaparoscopic or hand assisted colectomy during the COVID-19 pandemicwould havedecreasedLOS,however no significant difference was foundbetween pre-COVID and post-COVID LOS.As the COVID-19 pandemic continues to impact healthcare systems, this studywillbe expanded toevaluatetheimpactthis has on theLOS in a wider variety ofsurgical cases.

Table 1 Multivariable logistic regression by LOS

	OR	Standard Error	95% CI	p-value
Post-COVID	1.590	0.348	0.804–3.145	0.183
Any Complication	12.253	0.611	3.701–40.570	< 0.001
Any Comorbidity	0.663	0.357	0.329–1.337	0.251

P211

COVID-19 Microthrombosis: A Novel Cause of Total Gastrojejunal Anastomotic Disruption Following Roux-en-Y Gastric Bypass

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A 51 year old female with past medical history of hypertension, hyperlipidemia, obstructive sleep apnea, GERD, non-insulin dependent diabetes mellitus, morbid obesity with BMI 43.5 and a recent COVID-19 infection 2 months prior to surgery underwent a laparoscopic Roux-en-Y Gastric Bypass for weight loss. In an otherwise unremarkable procedure, the gastrojejunal anastomosis was fashioned using a 25 mm circular stapler. Intraoperatively, the gastrojejunal anastomosis was endoscopically inspected and tested using insufflation. On postoperative day one, anastomotic integrity was confirmed by computed tomography with oral contrast. The patient was subsequently initiated on and subsequently tolerated a bariatric clear liquid diet and was discharged following an unremarkable postoperative course

She then presented to the emergency department one week after discharge with complaints of dyspnea, right upper quadrant abdominal pain and nausea. On presentation, she was afebrile and hemodynamically appropriate, but found to have a leukocytosis to 15,000 and hemoglobin of 8.1. She tested positive for COVID-19 via a PCR based assay. Anastomotic integrity was again noted by computed tomography with oral contrast, which additionally identified a stable fluid collection in the upper abdomen thought to represent a hematoma. She was started on IV ceftriaxone and metronidazole and kept NPO. By hospital day three, she remained afebrile and hemodynamically stable but demonstrated a worsening leukocytosis

She was taken to the operating room for a diagnostic laparoscopy. Intraoperatively, ascites and hematoma were noted and evacuated. Upon inspection of the gastrojejunal anastomosis, complete disruption was noted along the lesser curvature of the gastric pouch. Upper endoscopy was performed, which identified diffuse ischemic changes with small vessel thrombosis—confirming gastrojejunal anastomotic disruption. The defect was patched with a pedicled omental flap, and buttressed with the falciform ligament. Following irrigation, two blake drains were placed. Postoperatively, the patient was kept NPO and started on total parenteral nutrition. She was transitioned to a bariatric clear liquid diet by postoperative day seven. She now tolerates a regular diet, and has continued to do well

Total disruption of a gastrojejunal anastomosis is rare. Given our intraoperative endoscopic findings at takeback, the anastomotic disruption in this case is thought to be secondary to ischemia due to COVID-19 associated microthrombosis. Though COVID-19 associated thromboembolism has been well established, this is the first reported case of gastrojejunal anastomotic disruption due to COVID-19 associated microthrombosis

P213

Delay of Elective Cases due to COVID-19 Pandemic did not Affect Surgical Outcomes for Elective Cholecystectomy

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Introduction: Elective cholecystectomies were among procedures deferred during the pandemic as recommended by guidelines published by various surgical organizations. However, no studies to date have studied the effects the delay has on surgical outcomes of elective cholecystectomies. The purpose of this study was to evaluate the impact of the COVID-19 pandemic on perioperative outcomes for elective cholecystectomies

Methods: We conducted a retrospective review of patients who were evaluated in outpatient clinic at a large urban safety-net hospital and eventually underwent elective cholecystectomy from 2019 to 2021. Cholecystectomies for acute cholecystitis were excluded. Patient characteristics, perioperative details, and operative outcomes were compared between patients in two time cohorts: six-month period leading up to cancellation of elective cases due to COVID-19 restrictions and six-month period after the resumption of elective cases. Statistical analysis was used to identify any significant differences between the two cohorts

Results: A total of 101 patients were included: 50 patients underwent elective cholecystectomy after the resumption of elective cases. Post-Resumption patients experienced longer duration of symptoms prior to their preoperative clinic visit (27 vs 20 months, P = 0.039). These patients also experienced a longer time to surgery compared to the patients in the Pre-COVID cohort (84 vs 120 days, P = 0.034). There was no significant difference in conversion to open surgery, length of hospital stay, postoperative complications, or readmission rates

	PRE-COVID	POST-RESUMPTION	P VALUE
OPERATIVE TIME (HRS)	2	2	0.288
CONVERTED TO OPEN	2%	4%	0.534
LENGTH OF STAY (HRS)	12	17	0.760
READMISSION	4%	4%	0.967
CBD INJURY	0%	2%	0.310
RETAINED STONE	2%	0%	0.325
WOUND INFECTION	0%	2%	0.305
INTRA-ABDOMINAL ABSCESS	0%	4%	0.145

Conclusions: Deferral of elective cholecystectomies was associated with longer duration of symptoms; however, these patients did not experience longer operative times or increased post-operative complications. If operative care has to be prioritized due to national emergencies such as a pandemic, elective cholecystectomies can be deferred without significant increases in post-operative morbidity.

P214

The Impact of the COVID-19 Pandemic on Procedure Time at a Multi-physician Gastroenterology Practice in Northern Kentucky

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Introduction: The purpose of this study was to determine the impact that restricting Responsible Accompanying Person (RAP) visitation had on the endoscopy center's throughput, patient experience, and patient satisfaction. The decision to restrict entry of RAPs was made in order to maximize the safety of patients, staff, and providers during the SARS-COV-2 / COVID-19 pandemic.

Methods: The study was conducted at a single specialty outpatient endoscopy center. The medical charts of 9 expert endoscopists were reviewed for two periods: (1) prior to COVID restrictions when RAPs could visit patients prior to and following procedures (2) during COVID when RAPs were not allowed entry into the facility. Post-procedure information and discharge instructions were given to patients in the presence of the RAP for the first group. That information was conveyed to the patient prior to discharge and to the RAP via telephone for the second group. All time measurements were in minutes. Procedures performed during special COVID aeration protocols were excluded. For both groups, calculation of length of colonoscopies, required pre-procedure history and physicals, room turnover, number of procedures starting late, and finished procedures after their allotted schedule were measured. We reviewed our standard patient satisfaction questionnaires for both groups.

Results: Mean results of all 9 endoscopists were reviewed separately and in aggregate. There was no statistically significant difference in procedure start time, turnover time, number of history and physicals, or number of finished procedures after their allotted time between the two groups. There was a statistically significant, but not clinically significant decrease in colonoscopy time during COVID for 2 of the 9 endoscopists. Patient satisfaction scores during COVID RAP restrictions decreased. Although patients still indicated they felt safe and were confident in their care during COVID RAP restrictions, the percentage of satisfaction fell from upper 90's to low 90's. There was a similar decrease in patient satisfaction as it related to the RAP receiving post-procedure information.

Conclusions: Visitation restrictions for the RAPs did not have a statistically significant impact on the patient's experience or colonoscopy throughput. It did have a negative impact on patient satisfaction as it pertains to information given to the RAPs. Patients were significantly more satisfied with post-procedure information being shared with both patient and RAP. Future studies evaluating the impact of the RAPs involvement in overall patient satisfaction may be beneficial.

P215

Timesaving in Surgical Office Visits with Telemedicine; the Lasting Legacy of COVID-19

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Introduction: Since the onset of the Covid-19 pandemic, virtual office visits is becoming a part of the permanent landscape of medicine, highlighting the importance of studying their impact on medical and surgical practices. This study examines the impact of virtual appointments on time spent in the office of a surgical practice.

Materials & Methods: 201 patient appointments within a combined bariatric and general surgery practice were included in this retrospective cohort study from November 2020 through December 2020. There were 104 in-office visits and 97 virtual visits. Descriptive statistics and student t-test were used to analyze the data based on visit type (new vs established vs post-op appointment). Also was included the average length of time spent by medical assistant per patient during in-office visits.

Results: The average length of time spent on new, established, and post-op patient visits conducted in the office setting were significantly longer than those conducted virtually (60 ± 20 vs. 12 ± 5 min, $p < 0.001$) (47 ± 27 min vs. 6 ± 3 min, $p < 0.001$) (49 ± 21 min vs. 5 ± 2 min, $p < 0.001$) respectively. This did not include the prep time of the virtual visits. Additionally, office staff members spent an average of 4.9 ± 2.6 min per patient in triage during in-office visits, whereas they were not required to participate in virtual visits when conducted.

Conclusion: The use of telemedicine technology to conduct virtual appointments within a surgical practice saves a significant amount of time for patients, physicians, and office staff when compared to in-office visits for specific cases.

Keywords: Virtual Appointment, Telemedicine

P216

The Impact of COVID-19 on Medium Term Weight Loss and Comorbidities in Patients Undergoing Bariatric Surgery and its Association with Psychological Wellbeing

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Introduction: The COVID-19 epidemic imposed significant stressors on the individual and changed how medical care is delivered. The affect that this stress has placed on the field of bariatric surgery and the associated outcomes is not well established.

Methods: A retrospective review of a prospectively collected database from a single academic institution was conducted. Weight loss and comorbidity outcomes were compared between a cohort of patients operated on during the pandemic and a matched group operated on prior to COVID-19. GAD-7 and PHQ-9 questionnaires were used to assess for anxiety and depression respectively.

Results: A total of 329 and 155 patients were enrolled in the pre-pandemic and COVID-19 groups respectively. There were no significant differences in pre-operative weight or comorbidities. Post-operatively, the weight was comparable at all time points out to one year. Comorbidity resolution rates were significantly faster in the control cohort. At six months the resolution of type II diabetes, hypertension, and hyperlipidemia were significantly higher pre-pandemic (p value = 0.007, 0.059, 0.083 respectively). By twelve months this resolution was not statistically significant. There was no difference in objective measures of anxiety and depression when comparing the two groups.

Conclusions: The COVID-19 pandemic has fundamentally changed how society and medical systems function. Focusing on pre-operative dietary training and screening for inadequately managed psychological comorbidities allowed for no significant difference in weight loss outcomes during COVID-19. There was, however, a difference in comorbidity resolution rates, perhaps showing that follow-up for co-morbidities was slightly delayed due to COVID-19 and the necessary implementation of telehealth.

P217

Environmental Contamination of SARS-CoV-2 in Hospitals

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Background: The COVID-19 (SARS-CoV-2) pandemic is a global concern and has changed the way we practice medicine in acute hospital settings. This is true with regards to patient triage, patient risk assessments, use of personal protective equipment (PPE) and environmental disinfection. Transmission of Covid-19 is primarily through respiratory droplets generated through talking, coughing or sneezing. There is, however, a potential risk that respiratory droplets settling on inanimate surfaces and objects in the hospital environment could provide a reservoir for nosocomial infections in patients and pose a health care risk to medical staff. Indeed, there have been previous reports of healthcare- associated outbreaks in hospitals. Several authors have argued that the risk of transmission via fomites may be insignificant but this not a view shared by The World Health Organization (WHO). The WHO does not rule out the possibility that fomites may play a role in the spread of Covid-19. Environmental contamination with SARS-Cov-2 in healthcare institutions has been shown to vary according to function or service provide by a unit or department. Information that identifies hospital areas that have a propensity for higher environmental burden may inform the practice of Infection Control and environmental cleaning and decontamination in healthcare institutions.

Aims: The aim of the study was to investigate environmental SARS-CoV-2 contamination in the clinical areas of patients with COVID-19 infections.

Methods: We conducted longitudinal swabbing of frequently touched surfaces, equipment and ventilation ducts in 5 specific clinical areas of Peterborough City Hospital which is part of the Northwest Anglia NHS Foundation Trust (NWAFT); Emergency Department, Intensive Care Unit, Isolation Ward, Respiratory Ward and a Gastroenterology Ward that was serving as a receiving ward at the height of the second Covid-19 infections wave in the United Kingdom. Surfaces to be swabbed were divided into patient zone, doctor zone and nursing zone.

Results: The most contaminated clinical areas were the three COVID receiving wards where 12% (11/96) of the swabs were positive. Inside the patient room these surfaces included bed rails and controls, bedside table, Television screen and remotes and room ventilation system. Outside the patient room these surfaces included Mobile computer and computer desk surfaces in the doctors' office. All swabs taken from Emergency department and Intensive care unit were negative.

Conclusion: Our study strengthens the evidence of environmental contamination of SARS-CoV-2. This highlights the importance of adequate environmental cleaning for proper infection control and prevention.

P218

How bad is Really Bad, eh? Impact of the First Wave of COVID-19 Pandemic on Residents Operative Volume: The Experience of a Canadian General Surgery Program

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Purpose: The aim of this study is to quantify trainees' operative volume and assess the the effect of the first wave of COVID-19 on general surgery residents training at a Canadian academic center.

Methods: An observational study was realized focusing on objective operative volumes, hands-on experience and subjective perceived impact of the pandemic by trainees. All residents enrolled at Université de Sherbrooke's general surgery program, rotating in all university affiliated centers were included. Quantitative data was collected from anonymized residents' case logs and annual departmental statistics. Qualitative data on resident's perception of the impact of the pandemic was provided by a resident led focus group. The period of interest, i.e. the first wave of the COVID-19 pandemic (January 1st to June 30thof 2020), was compared to a reference period (January 1st to June 30thof 2019).

Results: Case logs of all 21 residents enrolled in our program were reviewed. During the first wave of COVID-19 pandemic, residents logged a total of 475 cases, compared to 914 cases before the pandemic. This represents a decrease of 48% in operative volume: junior residents saw a decrease of 50% and senior residents saw a decrease of 46%. Post graduate year (PGY)-1 residents were most affected by the reduction of operative volume during the pandemic (58%) and PGY-4 s was the group least affected (37%). When looking at key procedures, juniors performed 71% less laparoscopic appendectomies and 49% less laparoscopic cholecystectomies during the pandemic. Senior residents saw a reduction of 55% in lower anterior resections and a reduction of 58% in right hemi-colectomies compared to reference period. The resident focus group discussion reveled that 92% of residents think the pandemic had significant drawbacks on their surgical skills and, they unanimously reported an overall negative effect on their training.

Conclusion: The COVID-19 pandemic compromised hands-on exposure of all residents. The reduction in operative volume affected all years of training, especially junior years. The negative impacts of the pandemic on surgical exposure raises concerns amongst residents about the short- and long-term effects on their technical skills. The data provided by this study will help Université de Sherbrooke's general surgery program and other programs nationwide create personalized mitigating measures. The insights brought by this study will help guide future curriculums to be more resilient in the face of a next sanitary crisis.

P219

Impact of Covid-19 on Patients Undergoing Cholecystectomy

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Introduction: Cholecystectomy is one of the most commonly performed general surgery procedures world-wide. The COVID-19 pandemic brought unexpected changes to daily medical operations with delays in elective, non-emergent procedures. We reviewed the impact of COVID-19 on our patients who had cholecystectomy during 2020 and compared them to a pre-COVID period at a quaternary care institution to assess changes in access to care and clinical outcomes.

Methods: Using the ORControl TM software, all patients who had cholecystectomies from Jan 1, 2016 to Aug 31, 2021 were queried from our facility. A total of 587 patients were identified as having undergone a cholecystectomy as an index procedure during this period. To assess the impact of COVID-19 on patients undergoing cholecystectomy, we compared preoperative diagnoses, surgical approaches, and outcomes in patients who underwent the procedure during 2019 and 2020.

Results: The number of cholecystectomies performed during 2020 was lower than 2019 (84 vs 105). The median age of patients undergoing cholecystectomy in 2020 was slightly younger than those in 2019 (57 vs 59 years). Despite the possible risk of viral transmission through aerosolized CO2 or surgical smoke produced during minimally invasive surgery (MIS), no difference in MIS rate was observed between 2020 and 2019 (both at 98%). The laparoscopic conversion to open cholecystectomy rate was similar at 4% for 2019 and 5% for 2020. None of the robotic cases were converted. The same day discharge rate was higher in 2019 at 40% compared to 26% in 2020 but re-admission rate (within 30 days from surgery) was similar at 6% for 2019 and 5% for 2020. The top three preoperative diagnoses in 2019 was biliary colic with cholelithiasis (50%), acute cholecystitis (22%) and chronic cholecystitis (10%). In 2020, the biliary colic with cholelithiasis was only 32%, acute cholecystitis 27%, choledocholithiasis 10%, gallstone pancreatitis 8% and other indications including polyps 8%.

Conclusions: During the COVID pandemic, fewer number of cholecystectomies were performed, related to delays and cancellations of elective, non-emergent operations. The potential risk of viral transmission during MIS surgery did not change the surgical approach. The decreased same day discharge rate in 2020 may reflect more serious pathologies – less simple biliary colic and more complicated pathologies. Delays and cancellations of scheduled operations may have increased severity of gallbladder inflammation leading to more challenging intraoperative findings necessitating admissions. We plan to further investigate reasons for the decreased same day discharge rate in 2020.

Year	2019	2020
Number of patients	105	84
Median age (years)	59	57
Number of MIS approaches	103 (98%)	82 (98%)
Laparoscopic	*68 (65%)*	*55 (65%)*
Robotic	*32 (30%)*	*24 (29%)*
Lap converted to open	*3 (4%)*	*3 (5%)*
Robotic converted to open	*0*	*0*
Same day discharge	42 (40%)	22 (26%)
30-day readmission	6 (6%)	4 (5%)

P220

Impact of COVID-19 on Surgical Procedural Utilization

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Background: Beginning of COVID-19 pandemic, in March–April 2020, led to a significant stress on healthcare systems. Governments, health systems and patients took actions to restrict/defer/cancel elective procedures. Our hypothesis at the beginning of the pandemic was that elective procedures (bariatric, hysterectomy, simple hernia repairs) would be impacted much more than relatively non-elective procedures (colorectal and thoracic cancer resections, complex hernia repairs).

Methods: Premier, a medical billing and cost data vendor, typically provides hospital level administrative claims data with a 3–6-month time lag. During Covid-19, Premier started providing data updates on a biweekly basis. Data represents ~ 1/5th of all US hospital encounters. We used data from January 2019 through the most recent months of 2021. We used ICD-10 and/or CPT codes to identify elective and non-elective procedures. We used 2019 volumes as baseline and calculated the proportion of 2020 volumes to the baseline as recovery rate. These were plotted as recovery rates along time axis to demonstrate recovery trends over time. For meaningful comparisons, we analyzed trends from hospitals that constantly contributed data across the available years in the database.

Results: Accounting for seasonal fluctuations, both elective and non-elective procedure volumes showed a significant dip when the pandemic started in March 2020 and hit the bottom in April 2020. Elective procedures saw a greater dip (69% and 18% of the baseline volumes in March and April 2020) than non-elective procedures (91% and 56%, respectively) (Fig. 1). Thereafter, elective procedure volumes recovered to baseline levels in June 2020 (98%). Non-elective procedure volumes showed a slower recovery as they were at 88% in June 2020.

Discussion: Non-elective (cancer, complex) procedures showed lower rate of cancelations at the beginning phase of the pandemic than the elective procedures. As the pandemic continued, we noticed that elective procedures recovered faster than non-elective procedures.

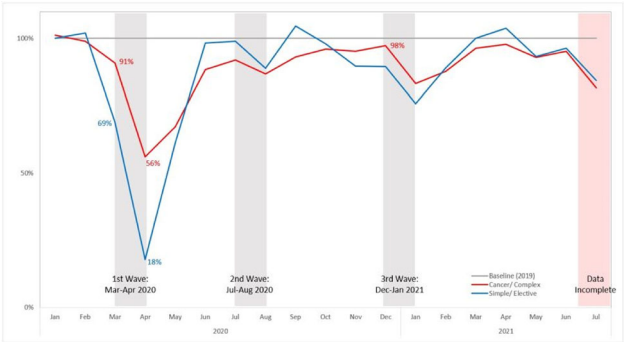

Figure 1. Procedure volume recovery rate by procedure types (baseline: 2019 volumes)

P221

Trends in the Incidence of Colorectal Cancer in Transgender Patients in the United States: A National Cancer Database Review

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Introduction: Gender has historically been viewed as a binary construct by the medical community. However, the conventional norms are changing as the transgender population exponentially rises. Transgender individuals have a gender identity or expression that is different than the sex that was assigned to them at birth. There are approximately 7 million transgender patients in the US, and this number is likely underestimated from disagreement on the definition, hesitancy to disclose, and demographic queries not accounting for gender transitions. There are no guidelines for colorectal cancer (CRC) screening in transgender patients, and evidence is lacking on rates of CRC compared to cis-gender patients. As some treatments could increase CRC risk and change screening needs, evaluation of CRC in transgender patients on a population level is important.

The goal of this study was to evaluate the trends and current incidence of CRC in the transgender population. Our hypothesis was that CRC rates were higher and patients presented with later stage CRC than cis-gender patients.

Methods: A review of the NCBD was performed from 2004–2017 for all colon, rectosigmoid, and rectal cancer cases. Cases were stratified by sex, as male (cis), female (cis), transexual-natal-male, or transexual-natal-female. Patient and provider demographics, clinical data, disease factors, intervention factors and outcomes were analyzed. The main outcome measure were the rates of CRC and advanced disease (pathologic stages III and IV) by sex over time.

Results: There are no results available. The NCDB does not provide an option for transgender in their demographic collection and does not report who is transgender or in transition.

Conclusions: There is no data on rates of CRC in transgender patients in the NCDB; the only options for sex are male and female. Changing data collection and reporting on a national scale to recognize preferred gender markers is a key initial step. Collecting data on transitions using a colon conduit or hormonal therapy is also critical. Evidence could be established to determine the long-term effects of gender-affirming hormone therapy on an individual's cancer risk, as well as best practices for screening the relevant anatomy. From evaluating this data over time, inclusive, comprehensive screening and prevention guidelines for CRC at all stages of transformation can be developed in this growing population.

P222

Medical Student Attitudes Towards Nutritional and Exercise Science Integration in the Curriculum

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Introduction: Application of the fundamental principles of nutrition and exercise in clinical management can improve the outcomes of highly fatal diseases, and since 2011, the AAMC has recommended medical schools emphasize nutrition and exercise management in their curricula [1]. While preventative medicine is a vital aspect of population health and an integral part of practice for those offering metabolic surgery for obesity, it is still not fully integrated into medical education across the United States [2, 3]. The purpose of this study is to assess whether a knowledge gap in preventative measures of nutrition and exercise exists amongst medical students. We aim to see if current medical education provides students the appropriate background for application of preventative medicine to clinical practice.

Methods: Study participants were pooled from current first, second, and third-year medical students attending The Medical College of Georgia. Of the total 614 students contacted, 42 first-year students, 49 s-year students, and 45 third-year students completed the survey. The survey consisted of 20 questions based on a 10-point Likert Scale that asked students to assess their own confidence in various aspects of nutrition and exercise education. Survey responses were aggregated and separated by year of medical training. Average response scores for each cohort were compared using a Mann–Whitney U test.

Results: Across the three classes, student average confidence levels in baseline nutrition and exercise understanding were less than 6.6/10, and average confidence in their ability educate patients on nutrition and exercise needs were less than 6.61/10. Yet, the average score for student perception of the importance of preventative medicine education was greater than 7.5/10. There were no statistical differences in scores amongst the three cohorts for 19 out of the 20 question responses.

Conclusions: Finding no significant difference between confidence score in an average third-year and an average first-year medical student suggests a ubiquitous deficit in nutritional and exercise education in the current curriculum. The confidence scores presented are concerning for poor understanding of exercise and nutritional science principles which could result in poor delegation of preventative advice in the clinical setting. As such, it appears that the current education model is not preparing students for counseling on patients regarding nutrition and exercise. This knowledge deficit will not only impact providers offering metabolic surgery, but it will also negatively impact many of the referring primary care providers who are often the key providers for preventative medicine.

P223

Robotic Simulation: Validation and Qualitative Assessment of a General Surgery Resident Training Curriculum

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Background: The purpose of this study is to validate the *SimNow* resident robotic basic simulation curriculum. The *daVinci* skills simulation curriculum has previously been validated in the literature. The updated simulator, *SimNow*, features restructured exercises that have not been formally validated. This study also consists of a qualitative assessment that gives greater insight into the learner's experience completing the robotic curriculum.

Methods: There were 18 participants in this study: 6 novices (medical students with no surgical experience), 6 competent surgeons (general surgery residents with 2–30 robotic console cases), and 6 expert surgeons (> 50 robotic cases). The curriculum consisted of 5 exercises; participants completed one practice trial then three consecutive scored trials. Computer-derived performance metrics were recorded. Metrics were analyzed with an ANOVA and Tukey's test. The NASA Task Load Index (NASA-TLX) survey was used to assess subjective mental workload. After completing each exercise, subjects were asked a series of open-ended qualitative questions regarding their experience that were recorded and transcribed. Codes were identified using an inductive method, and themes were generated.

Results: Performance metrics for nearly all categories were significantly different between the groups. The significant differences were primarily between novices versus competent and expert surgeons. There was no significant difference in any score metric between competent and expert surgeons. On average, overall score percentages for competent and expert surgeons among all exercises were between 90.4% and 92.8% versus 70.5% for novices ($p = 0.02$ and $p = 0.01$, respectively). Time to complete was significantly different for every exercise. Expert surgeons perceived a higher level of performance completing the goals of the exercises than novice surgeons (15.8 vs 45.8, respectively, $p = 0.02$). Through the qualitative interviews, participants noted a similar robotic experience, utilizing efficiency of motion and visual field skills. Participants generally agreed on exercise strengths, exercise weaknesses, and software limitations. Competent and expert surgeons were better able to assess the exercises' clinical application.

Conclusions: The *SimNow* curriculum is a valid simulation training as part of a general surgery resident robotic curriculum. The curriculum distinguishes between novices compared to competent and expert robotic surgeons, however not between competent and expert surgeons. Experience and overall mental workload using the robotic simulator are not affected by training level, except for competent and expert surgeons' ability to assess clinical application better. Overall, regardless of training level, the *SimNow* curriculum is an adequate assessment of robotic simulation skills.

P224

Improving the Quality, Objectivity, Readability, and Tone of Online Information About Hemorrhoids

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Objective: Hemorrhoids are recognized as one of the most common medical conditions in the general population, with approximately 1 in 20 Americans having hemorrhoids. In 2012, the Food and Drug Administration labeled hemorrhoids as the "top-trending health issue search" in the United States. However, most people don't want to talk about hemorrhoids. With studies showing over 50% of individuals relying on internet resources for management, the information available for public digestion is critical. An evaluation of the online information quality of hemorrhoids is warranted to ensure patients are receiving adequate information to meet their needs.

Methods: Web searches were completed on the three most popular search engines (Google, Yahoo, Bing) using the search phrase "Hemorrhoids". The first 60 search results on each browser were considered for analysis. 124 sources met our inclusion criteria and were analyzed for (1) quality using the DISCERN tool (2) presence of stigmatizing language using a cited list of stigmatizing words (3) readability using the Flesh Reading Ease Score and Kinkaid Grade Level and (4) dominant tones of text using the IBM Watson Tone Analyzer. Three regression models were created to assess factors independently associated with quality, stigmatizing language, readability, and dominant tones of website content.

Results: Most websites exceeded the recommended readability level of 6th grade and had poor quality of treatment information content, with websites on hemorrhoids scoring an average of 2.7 out of 5 on the DISCERN instrument for evaluation of quality, indicating below-average quality of information. Analysis of tone indicates website preference for, almost exclusively, four tones regardless of the search engine utilized: fear, sadness, analytical, and tentative. Positive tones were hardly noted. Lastly, key stigmatizing words were present in most online sources.

Conclusion: There is a discrepancy between the availability of online information about hemorrhoid management and the quality of online information patients trust before going to see a physician. Websites provide language about hemorrhoids that is difficult to read, biased by profit status and HealthOnNet (HON) code, and contains a significant level of stigmatizing language. The tones that these websites focus on are mostly neutral to negative. Consideration and elimination of such language from online sources about hemorrhoids, and other related medical conditions, can improve accuracy of information, perception of disease, and seeking of treatment.

P225

Safe Laparoscopic Appendectomy Performed by General Surgery Resident

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Background: Minimally invasive surgery become popular worldwide. Nowadays, laparoscopic appendectomy (LA) is frequently performed by US general surgery residents. However, general surgery residents in Thailand have far fewer experiences in LA. Aim of our study was to investigate the effects of fresh cadaveric training program on the proficiency of general surgery residents in LA.

Material and Methods: In December 2020, senior residents were received a fresh cadaveric skill training program in LA. Each resident handed on LA in cadaver for 30 min. We retrospectively review the outcome of LA and open appendectomy (OA) performed by general surgery residents from January to June 2021. We evaluated the conversion rate as the primary endpoint. LA and OA were compared regarding mean operative time, length of hospital, reoperation rate and readmission rate.

Results: Thirty-nine and Forty-seven patients were underwent LA and OA, respectively. The overall conversion rate of LA was 10%. Complicated appendicitis was a significant risk factor for conversion (57% vs 0%, $P < 0.001$). LA group had shorter mean operative time (67 min vs 83 min, $P = 0.065$) and length of hospital stay (4.0 days vs 5.7 days, $P = 0.004$) when compared to OA group. However, the proportion of complicated appendicitis was significantly lower in LA group when compare to OA (18% vs 40%, $P = 0.034$).

Conclusion: Fresh cadaveric skill training program in LA can enhance resident skill and maintain patient safety. After the program, we can entrust general surgery residents to perform LA without supervision. This strategy is safe and can stimulate surgical autonomy.

P226

Virtual Learning Environment for Surgery Residents in a Third Level Hospital at Mexico City, a Teaching Alternative

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A virtual learning environment is a virtual educational space composed of a set of computer tools that allow students to carry out didactic interaction, as well as to converse, read and work in team. [1]

The objective of the different medical training institutions is to ensure that the student meets the demands of society and achieve the training of a professional with the skills that allow him to face his profession. [2]

Currently thinking about teaching and learning with a traditional approach is a path to failure, and this coupled with the health crisis that impacted the world in 2020 due to COVID-19, forces these new generations to find alternatives in the learning processes. [3]

The use of virtual environments has been imposed in the teaching and learning processes suddenly due to the pandemic, replacing the face-to-face workload and adapting new content to strengthen critical judgment, clinical thinking and, above all, establish the link between teachers and students, as well as supplying skills and abilities training through simulation.

The objective of this study is to demonstrate the efficiency of the use of virtual learning environments in the general surgery residency and emphasize that this strategy does not supplement the skills that are developed during clinical practice, but rather complements them.

A survey was applied to 28 medical residents from the General Surgery department of the Hospital Juarez de México, who were part of the adjustments implemented during the 2020–2021 academic year with the following results:

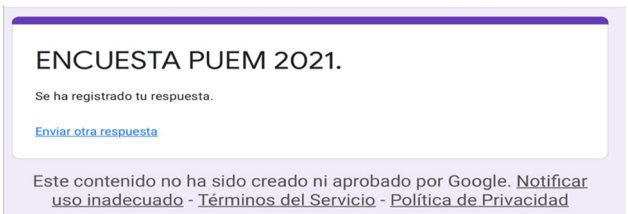
96% of the residents participated in the survey; 79% agreed that virtual lessons on the Zoom platform were suitable for revising the academic program of their respective residency year and that the topics involved, according to the unique program of medical specialties (PUEM) were covered; this same population obtained an outstanding score in the PUEM examination. All the participants agreed that the contents were clear and understandable.

96% of the residents answered that the activities were useful to improve learning and that teachers had an indispensable role in this strategy.

The pool of applicants highlighted their concern about the development of skills that can only be carried out by practice and working on said skills.

Visual learning environments allow the development of educational activities without the need to coincide in space or even in time.

The main and most important disadvantage is that face-to-face practice cannot be substituted with any other strategy.



P228

The Impact of Trainee Involvement During Robotic Colectomies in the Veteran Population

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Introduction: Multiple studies report that trainee involvement in minimally invasive surgery (MIS) is associated with increased operative time and hospital length of stay (LOS). The objective of this study is to examine the impact of trainee involvement on the outcomes of robotic colectomies performed within the Veterans Health Administration (VHA).

Methods: All patients who underwent colectomy in the VHA between October 1999 and September 2019 were identified using CPT targeted codes within the National Veterans Affairs Surgical Quality Improvement Database. Robotic cases were then selected with the HCPCS modifier code for robotic surgery, which narrowed the cohort to 800 patients. Demographics and postoperative variables were then compared based on the presence of a trainee. Univariate analysis was performed for operative time as a primary outcome and morbidity as a secondary outcome, with $p < .05$ considered significant. All variables with $p < 0.1$ along with trainee involvement were entered into regression models for both operative time and morbidity.

Results: A total of 432 cases were performed by an attending alone and 368 cases involved a trainee. The demographics between the groups were comparable with only significant differences in race, peripheral arterial disease, and wound class. Mean operative time was longer in the attending-only group compared to the trainee group (4.86 ± 1.732 h vs 4.64 ± 2.066 h, p = .021) while LOS was shorter in the attending-only group (6.91 ± 6.670 days vs 6.99 ± 6.030 days, p = .159), however these differences were not statistically significant. 30-day mortality (0.2% vs 0.0%, p = .356) and overall morbidity rates (15.3% vs 14.4%, p = .729) were similar between the two groups. In multivariate analysis, trainee involvement was an independent predictor for decreased operative time (p = .009). Other independent predictors for operative time in multivariate analysis included peripheral arterial disease, BMI, malignant pathology, preoperative radiotherapy, and preoperative sepsis. In univariate analysis for morbidity, the presence of a trainee was associated with a slightly higher risk for morbidity that was not statistically significant (OR .933, CI .631–1.380, p = .765). In the multivariate regression model, increased BMI, hypertension, prior myocardial infarction, and preoperative radiotherapy were independent predictors for 30-day morbidity, however trainee involvement was not.

Conclusion: Resident participation in robotic colectomy within the VHA does not demonstrate a clinically or statistically significant impact on morbidity or mortality. This study showed that trainee involvement was associated with decreased operative times and did not statistically impact perioperative morbidity or intraoperative outcomes.

P229

Active Control Time (ACT): An Objective Metric for Trainee Participation in Robotic-Assisted Surgery

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Introduction: Performance feedback for trainees in operative procedures is critical but largely subjective and often given sporadically. Computer-assisted technology such as the da Vinci Surgical System now offers the potential to provide and track objective, quantifiable performance metrics. In this study, we aim to validate the use of a novel objective robotic metric—active control time (ACT)—for assessing trainee participation in robotic-assisted cases.

Methods: User performance data from Intuitive (Sunnyvale, CA) was retrospectively analyzed for all robotic cases involving trainees with a single minimally invasive surgery faculty at our institution from September 2020 through July 2021. As the primary outcome metric, percent ACT was defined as the amount of trainee console time spent in active system manipulations over total active time from both consoles. Kruskal–Wallis and Mann Whitney U statistical tests were applied in analyses.

Results: A total of 123 robotic cases with 18 general surgery residents (PGY1-5) and 1 fellow were included. In total, there were 79 hiatal hernia repairs, 11 Heller myotomies, 12 cholecystectomies, 6 inguinal hernia repairs, and 15 other robotic cases performed. Of these, 56 were categorized as complex robotic cases. Median percent ACT was statistically different between trainee levels for all case types taken in aggregate (6.1% for PGY1s, 32% for PGY3s, 42% for PGY4s, 50% for PGY5s, 61% for fellow, $p = < 0.0001$) (Fig. 1A). Post hoc analysis revealed specific differences in median percent ACT between the PGY1 and PGY5 groups ($p = 0.0005$) and PGY1 and fellow groups ($p = < 0.0001$). When further stratified by case complexity, median percent ACT was statistically higher in standard compared to complex cases for PGY5s (60% v 36%, $p = 0.0002$) and the fellow (74% v 47%, $p = 0.0045$) (Fig. 1B).

Conclusions: In this study, we were able to demonstrate an increase in percent ACT with increasing trainee level. Senior trainees also showed significantly greater percent ACT in standard versus complex robotic cases. These findings are in line with predicted participation trends, suggesting that ACT is an objective tool with face validity that can be used as a surrogate for trainee participation in robotic cases. This is the first study to investigate a standard metric for active operating time in robotic surgery training. In future studies, we will aim to delineate both procedure and component specific ACT. We predict that this metric will eventually assist in defining trainee autonomy on the robotic platform.

Figure

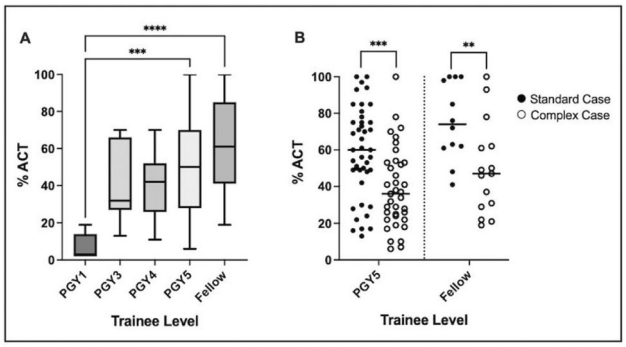

Figure 1A: Median percent ACT in boxplot showing case distribution by trainee level
Figure 1B: Median percent ACT in standard versus complex cases for PGY5s and fellow

P230

Impact of a Standardized Skills Training Program on Successful Completion of Fundamentals of Laparoscopic Surgery (FLS) Certification

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Introduction: Fundamentals of laparoscopic surgery (FLS) certification is a mandatory part of general surgery training which is typically completed in the final year of general surgery residency. We sought to determine whether completion of FLS certification earlier in residency was feasible and compare pass rates based on post-graduate level and previous laparoscopic experience.

Methods: All post-graduate year (PGY) two though five residents at a single institution completed a faculty-led training session on FLS skills with didactic instruction, demonstration, and individual proctored practice of each of the five skills elements of the FLS exam. Residents were then timed on completion of each skill and those residents whose times were approaching the SAGES proficiency levels were allowed to sign up for FLS testing. Residents who were not meeting proficiency were required to do additional proctored training sessions. All residents were given access to the simulation center to complete additional independent training as desired. Resident training year and total previous laparoscopic case numbers at the time of testing were recorded. After testing, residents participated in an exit survey to gauge their participation in pre-test training and their opinions regarding the training program. FLS exam scores were recorded for each resident for both the written and skills portions of the test.

Results: In total, 30 of the 32 surgical residents in the program completed FLS testing within the academic year (94%). Most residents (66%, n = 21) required only one faculty-led training session to meet proficiency metrics prior to testing, though all residents also reported completion of some independent training after the faculty-led session and prior to FLS testing (46% 1–2 sessions, 29% 3–5 sessions, 25% > 5 sessions). After completing training, 90% of residents felt either "extremely or somewhat confident" that they would pass the exam. Of the 30 residents who tested, 28 passed the exam (93%). Both failures occurred in PGY-2 residents; one in technical skills and one in the written portion of the exam. Despite this, there were no statistically significant differences in exam scores based on PGY level ($p = 0.34$ skills, $p = 0.13$ written). Increased laparoscopic case volume did correlate with improved written exam score ($p = 0.03$), but no difference was noted in technical skills score ($p = 0.8$).

Conclusion: Fundamentals of Laparoscopic Surgery (FLS) certification can be successfully completed by junior level residents. Moving this testing to junior years may have a more meaningful impact on resident development and encourage earlier concentration on development of laparoscopic skills.

P231

The Limitations of Surgical Hierarchy: A Needs Assessment in Peer Feedback Practices Within a Surgical Residency Program

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Introduction: Residents report not receiving enough meaningful feedback on clinical skills. Prior studies demonstrated that peer feedback on technical skills improved performance. Additionally, successful residents seek out friendships with mentoring roles within their program. The purpose of this study is to first understand the quantity and quality of the current feedback practices in an independent academic surgical residency program, and secondly identify opportunities to improve our process and shift hierarchical culture in feedback exchange.

Methods and Procedures: We developed a needs assessment survey to measure the frequency with which residents receive, give, and desire to receive feedback. We assessed feedback quality based on a previously published conceptual framework emphasizing timeliness, specificity, and actionability. We measured comfort giving feedback to and receiving feedback from residents of differing levels on a five-point rating scale. Non-parametric Sign tests were used to compare paired ratings of comfort.

Results: 25 of 28 residents (89%) responded. Most reported prior training in giving feedback (96%) and felt they should receive (68%) and give (64%) feedback at least weekly from other residents. On a Likert scale (strongly disagree to strongly agree), residents felt neutral about the quality of feedback received: timely (mean = 3.24), specific (3.40), and actionable (3.44). While comfortable with receiving feedback from any level ($p = 0.08$), residents were more comfortable giving feedback to those junior (median [md] = 4) rather than those senior (md = 2) to them ($p < 0.001$). Residents were more comfortable receiving feedback from someone junior (md = 4) than giving feedback to someone senior (md = 2) to them ($p = 0.002$). The most common barriers to effective and valuable feedback cited were lack of time, hierarchy, misinterpretation or resistance from the receiver, and fear of hurting the receiver's feelings.

Conclusions: This study reveals gaps in the current feedback practices of a residency program without formal feedback education and highlights both practical and cultural barriers. The measured quality of feedback leaves room for improvement. The openness to receiving feedback from all levels invites an intervention to curtail hierarchical barriers to quality bidirectional feedback. We have initiated formal feedback training amongst the residents, providing techniques to give quality depersonalized feedback and responses. We have implemented weekly bidirectional feedback sessions within the protected educational time, addressing concerns regarding time constraints within busy clinical practice. In providing dedicated feedback education, we hope to challenge the current cultural paradigm and improve trainee performance.

P232

Better Surgical Ward Round: Replicating Near-Peer Teaching (NPT) on a virtual international platform During the COVID-19 pandemic organized by the IASSS

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Introduction: Clinical based medical education has always been a major source of learning and this has inevitably been impacted by the physical restrictions due to COVID-19. We conducted a near-peer teaching program called the "Better Surgical Ward Rounds" on an international virtual platform organized by the International Association of Student Surgical Societies (IASSS). IASSS is an official pre-specialist society of the International Society of Surgery (ISS-SIC) which aims to improve surgical training for medical students in low-middle-income-countries.This ward round template aims to standardize key aspects of care that otherwise may be neglected. We aim to describe how the program has benefited the participants.

Methods and Procedures: 'Better Surgical Ward Rounds' program was conducted on 14th August 2021, on Zoom platform with 88 registered participants from 17 countries. We introduced a surgical ward round checklist which was based on the SHINE Surgical Ward Round Toolkit with modification from the speaker's experience as a Singaporean surgical trainee in an Asian hospital setting. Pre and post program questionnaires were used to assess the participant's confidence (on a scale of 1 to 7) in performing during surgical ward rounds. Other aspects assessed included participants' training level, exposure to surgical ward rounds, perspectives regarding surgical ward rounds, common overlooked issues and feedback for this program.

Result: There were 23 pre-program responses and 18 post-program responses from participants in eight countries (Table 1). 60.9% had some experience with surgical ward rounds. Up to 90% of participants felt that surgical ward rounds can be more organised. Common issues highlighted included unorganised case presentation, unstructured teaching of juniors, neglect of patients' psychosocial issues and expectations. Introduction of a checklist as a template was generally agreed to be a solution for these issues but some felt that local adaptation is required due to differences in working culture. After the program, all participants felt that it has improved their ability to organize their surgical ward rounds. They rated their confidence in performing efficient surgical ward rounds from pre-program of 4.3/7 to 5.6/7 post-program.

Table 1 Training level of participants

Training level			
Clinical Students	Pre-clinical Students	House Officers	Surgical Trainees
60.9%	17.4%	13%	8.7%

Conclusion: In addition to imparting classroom knowledge through virtual learning, this program is an example of keeping near-peer teaching alive and providing organizational skills for students or junior doctors who are transitioning to clinical work in this pandemic.

P233

Development of a Model to Simulate Continuous Suture Flap Closure During Transabdominal Preperitoneal (TAPP) Inguinal Hernia Repair

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Introduction: Laparoscopic transabdominal pre-peritoneal (TAPP) hernia repair requires the development and closure of a peritoneal flap (PF). Suture closure of the PF has been shown to decrease short-term discomfort and movement limitation compared to tacks. The learning curve for suturing the PF is steep, mostly related to suturing ergonomics, and currently there is no simulator that allows surgical trainees to practice PF suturing prior to performing it in the operating room.

Objectives: (1) To develop a low-cost synthetic model for PF closure that simulates TAPP suturing angles; and (2) To gather preliminary evidence from expert surgeons for its application as a training model.

Methods: Using an iterative process, we designed a 3D re-usable model, made of low-cost materials that resembles the pelvic wall as appreciated during TAPP, and that is used in an FLS box with standard laparoscopic instruments. MIS experts were invited to test the model by performing a simulated flap closure. They completed a pre- and post-simulation questionnaire. The pre-simulation questionnaire included baseline demographics and questions regarding surgical expertise and practice patterns. The post-simulation questionnaire focused on feasibility and educational value of the model, specifically for improving intra-corporeal PF closure.

Results: Five experts participated in the study and provided feedback. All experts were FLS certified, performed laparoscopic continuous suturing > 30x/year, and 4/5 had been in practice for > 5 years. All performed TAPP hernia repairs 1-10x/year and 4/5 utilized suture for PF closure. 4/5 participants agreed that the simulator was similar or slightly easier compared to PF closure in the operating room, and they all thought that it would be effective for improving needle handling/positioning, continuous suturing, and efficiency of flap closure. Experts suggested that this model was most suitable for: senior residents(3), junior residents(1) or all levels of experience(1). Experts varied in their responses regarding how many hours residents would need to practice in the model to achieve competency; 3 of the 5 suggesting < 6 h, and the other 2 responding 6-12 h and > 12 h.

Conclusion: The 3D model we developed has validity evidence as a tool to practice laparoscopic PF closure for TAPP. It is low cost, easily reproduced and can be used in an FLS box. Expert surgeons all considered it to be a potentially useful adjunct to the skills training curriculum. Additional studies are needed to assess if trainees can use the model to decrease their PF learning curve prior to going to the operating room.

P235

Resident Perception and Outcomes in the Fundamentals of Endoscopic Surgery: A Single Institute Review

Mark E Mahan; James M Haggerty; Kathleen Nealon; Katie Frank; John Widger; Alexandra Falvo; Ryan D Horsley; Geisinger

Introduction: The importance of simulation in surgical training has been well recognized dating back to 2008 when the Residency Review Committee mandated all surgical programs have access to simulation centers. Thereafter the Fundamentals of Endoscopic Surgery (FES) was established and became required by the American Board of Surgery for graduation criterion in 2018. We sought to evaluate what resident factors lead to successful FES skills examination and resident perception regarding examination outcome.

Methods: Surveys were given to 32 General Surgery residents before and after the FES examination over a 4-day period in March 2020. Residents ranged from PGY 2 – 5. Respondent demographics, exam preparation and perception were summarized. Continuous variables were expressed as median and interquartile range; categorical variables were expressed as counts and percentages. Bivariate analysis of respondents' characteristics with pass/fail status consisted of Mann–Whitney U tests for continuous variables and Chi-squared tests or Fisher's exact tests for categorical variables. A similar bivariate analysis was conducted for the campus variable. All statistical tests were two-sided, and a p-value < 0.05 was considered statistically significant. Analyses were performed using R version 4.0.5 (R Core Team, 2021).

Results: There were no significant differences in FES exam pass/fail status for any of the demographic factors, including campus: 87.5% of Central versus 100% of Northeast residents written pass rate ($p = 0.484$), and 100% of Central versus 87.5% of Northeast residents skills pass rate ($p = 0.484$).

Central residents were more experienced than Northeast campus residents: 81.3% vs. 37.5% PGY4 or PGY5 ($p = 0.029$), 93.8% vs. 43.8% ≥ 50 upper endoscopies ($p = 0.008$) and 100% vs. 43.8% ≥ 50 colonoscopies ($p = 0.001$). Central campus reported fewer hours of simulator practice, with medians of 2 and 4 h, respectively ($U = 65.5$, $p = 0.019$).

On pre-examination survey 34.4% of residents did not feel adequately prepared and afterward 40.6% felt they did not pass the examination. 81% of resident's commented requesting further simulation exposure.

Conclusion(s): Central campus had less simulation time with greater overall endoscopic exposure, compared to Northeast campus residents. Although not statistically significant we found that Central campus residents were more likely to pass the FES skills examination. Despite this, further simulation exposure was request by the majority of all residents. It is unclear and worrisome that only 59.4% of residents felt they passed the examination, when most met ACGME endoscopic standards, and the overall pass rate was 87.5%.

P236

Validation of EndoMIMYK Performance Metrics: Correlation Between Endoscopy Simulator Scores and GAGES Scores

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Introduction: Training for endoscopic procedures requires significant time and hands-on experience. Proficiency in endoscopy skills can be accelerated by introducing validated virtual reality simulators in the early stages. Global Assessment of Gastrointestinal Endoscopic Skills (GAGES) score is widely accepted as an objective measure of endoscopy skills. In this study, our primary aim was to compare the EndoMIMYK simulator performance metrics and GAGES scores to validate the scoring mechanism of the EndoMIMYK simulator.

Methods: A total of 21 doctors participated in this study and were classified into two groups: 7 novices (nil endoscopy experience) and 14 beginners (< 200 endoscopies performed). All the participants performed an upper GI endoscopy exercise while an expert endoscopist (> 200 endoscopies performed) evaluated their performance on GAGES scale. Performance metrics measured by the EndoMIMYK simulator were also recorded: total procedure time, insertion time, withdrawal time, path length of instrument travel, percentage of mucosa visualized, percentage red out, cumulative score, efficiency score.

Results: According to both the simulator and GAGES scores, beginners performed marginally better than novices, but the results were not statistically significant ($P > 0.05$). Correlation coefficients for GAGES intubation score and simulator intubation time ($|r| = 0.2668$ for novices; $|r| = 0.3547$ for beginners); GAGES navigation score and simulator procedure time ($|r| = 0.2637$ for novices; $|r| = 0.1851$ for beginners); and GAGES quality of examination score and simulator cumulative score ($|r| = 0.7358$ for novices; $|r| = 0.2513$ for beginners) were not statistically significant ($P > 0.05$).

Conclusion: We demonstrate that there is a correlation between the corresponding simulator and GAGES scores but because of insufficient sample sizes and class imbalance, the results are not statistically significant. Further validation studies with more sample sizes are needed to establish the validity of the EndoMIMYK scoring mechanism against the GAGES scale.

P237

Development of a Simulation Ventral Hernia Repair Curriculum using the AWSSOM—A synthetic Abdominal Wall Surgical Skills Operational Model

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Introduction: Ventral hernias are a common complication following abdominal surgery, resulting in over 400,000 ventral hernia repairs being performed annually in the United States and costing over 3 billion dollars each year. There is no dedicated, cost-effective, hands-on abdominal wall reconstruction simulation curriculum for general surgery trainees. Some residency programs conduct cadaver labs for hands-on experience, but a single cadaver can cost upwards of $1500–2000. This project aims to create and implement a basic and advanced ventral hernia repair simulation curriculum using a cost-effective and easily reproducible novel abdominal wall reconstruction model.

Methods: A ventral hernia repair curriculum, incorporating didactic content followed by hands-on practice, is being developed using a modified laparotomy closure model previously developed by our group. The Abdominal Wall Surgical Skills Operational Model (AWSSOM) has pertinent abdominal wall layers used in various ventral hernia repairs. The cognitive objectives of the curriculum include correct identification of the abdominal wall layers and neurovascular structures, classification of types of ventral hernias, differentiation of distinct repair techniques with mesh placement, and listing the steps of various ventral hernia repairs. Psychomotor objectives include the performance of an onlay, sublay/retrorectus, and underlay mesh repair. Learners will be assessed using a pre/post-curriculum design based on the learning objectives for both didactic and hands-on practice. In addition, the confidence of procedural performance in the operating room will be assessed before and after curriculum implementation.

Results: This curriculum is targeted towards general surgery trainees at all levels of training. It will consist of a pre-assessment followed by didactic instruction and dedicated hands-on experience founded on evidence-based best practices per AHS, EHS, and SAGES guidelines. Didactics will include an interactive discussion based on the literature provided to learners prior to instruction. Learners will then engage in dedicated practice using the AWSSOM task trainer to perform the three ventral hernia repair techniques described above correctly. The AWSSOM mold has a one-time $50 cost, with each 24 $\times$ 24 cm AWSSOM model carrying a recurring cost of $4.09 to create, making it exponentially cheaper than a cadaver-based curriculum.

Conclusion: We are developing a simulation curriculum for ventral hernia repair with mesh, using a novel abdominal wall model for surgical trainees to enhance essential surgical skills. The curriculum will be tested for effectiveness and modified as needed based on learner feedback with the goal of dispersing to other interested training programs.

P238

Educational Effectiveness of Social Media as a Continuing Professional Development Intervention for Practicing Surgeons: A Systematic Review

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Background: Social media is gaining popularity as an educational tool for practicing surgeons. The use of social media has been shown to increase surgeon's knowledge; however, improvements in other educational outcomes are not well documented. We performed a systematic review of the literature to determine the educational effectiveness of various social media interventions for practicing surgeons and categorized the educational outcomes using Moore's expanded Outcomes Framework for Assessing Learners and Evaluating Instructional Activities.

Methods: We performed a comprehensive search of electronic databases (Ovid MEDLINE, Ovid MEDLINE Daily and Epub ahead of print) using broad search terms from 1994 to present. Language limits were set to English and Spanish. We included studies assessing the educational effectiveness of social media interventions for practicing surgeons. We excluded studies involving surgical trainees and those not evaluating the educational effectiveness. Two independent reviewers assessed the studies for relevance and inclusion. We assessed the quality of evidence using CASP tools. Two independent reviewers performed data abstraction and categorized educational outcomes using Moore's framework.

Results: We retrieved a total of 352 studies. After screening, abstracts, titles and full-texts, 11 duplicates were removed, and 336 studies were excluded. Five studies were selected for inclusion in our review. We rated 3 studies as moderate and 2 studies as strong in study quality. One Study demonstrated an improvement in surgeon's knowledge (Moore's Level 3), 2 studies demonstrated improvement in surgeon's skills (Moore's level 4) and 1 study demonstrated a change in surgeon's practice (Moore's level 5).

Conclusion: There is limited evidence for use of social media to improve surgeon's knowledge, skills and change surgeon's practice; however, it's impact on higher level education outcomes is still unknown.

P239

Intern Surgical Skills Rotation Improves Proficiency of Technical Skills

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Introduction: Historically, surgical technical skills have been obtained through experience in the operating room; however, with the emergence and popularity of simulation, surgical experience can be supplemented with simulated tasks and procedures. Our study aims to evaluate the efficacy of our institution's Intern Surgical Skills Rotation in improving proficiency of technical skills. By providing a one-month rotation to dedicate to the practice of laparoscopic, robotic, and endoscopic skills, we hypothesize trainees will demonstrate improvement in efficiency, accuracy, and confidence with fundamental skills.

Methods: General surgery interns performed the Fundamentals of Laparoscopic Skills (FLS) tasks at the beginning and end of their Intern Surgical Skills Rotation. The tasks (peg transfer, pattern cut, ligating loop, extracorporeal suture, and intracorporeal suture) were timed pre- and post-rotation. Objective data were then anonymized, and SPSS was used for statistical analysis. T-test was used to compare the mean time of each task pre- and post-rotation. An alpha level of 0.05 was used to assess statistical significance.

Results: Ten general surgery interns have completed the Intern Surgical Skills Rotation. Objective data revealed a statistically significant decrease in the time required to complete all five tasks following the rotation. For peg transfer, mean time decreased from 130.7 to 41.3 s ($p < 0.0001$); for pattern cut, 177 to 83.9 s ($p = 0.0006$); for ligating loop, 89.3 to 50.5 s ($p = 0.0366$); for extracorporeal suture, 92.7 to 83.8 s ($p < 0.0001$); and for intracorporeal suture, 431.7 to 86 s ($p < 0.0001$).

Conclusions: Our institution's Intern Surgical Skills Rotation provides dedicated time to the practice of laparoscopic, robotic, and endoscopic skills with a significant improvement in the performance of fundamental skills.

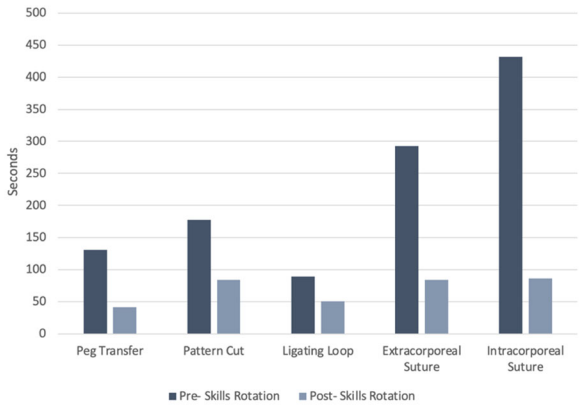

Figure 1. Timed performance of laparoscopic skills pre- and post- Intern Surgical Skills Rotation.

P240

The Integration of a Formalized Robotic Training Program Within the General Surgery Residency Program

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Introduction: Recent data shows the United States now performs more robotic surgeries than any other country in the world. As the need for robotic skills becomes an imperative part of the surgeon's skill set, there is now a push to start robotic training during the residency training period. The importance of having a validated training curriculum stems both in providing patient safety and ensuring adequate credentialling. In a recent study, it was found 92% of programs have residents participating in robotic surgeries. However, only 44% track resident robotic experience and only 55% have a formalized training program with recognition of completion. While many programs offer robotic experience and training, these vary greatly and often lack formalized documentation and credentialing.

Methods/Procedures: Our program developed a robotic curriculum that is outlined below:

Interns	Juniors	Seniors
- basic robotic class - online modules - console modules - complete docking cases - start to sit at console and observe procedures	- start to perform parts of procedures and gradually gain independence - should be able to suture, troubleshoot robot, visuospatial understanding	- independently perform basic procedures (inguinal/ventral hernias, cholecystectomies) - complete more complex procedures (sleeves) - gain experience in complex procedures (whipple, colorectal, esophagectomies, gastrectomies)

The goal is to complete 10 + docking procedures and 20 + independent surgical procedures by the end of residency. Each resident is expected to document all cases and provide robotic case log. Upon completion, formal certification in robotic surgery is awarded.

Results: All surgical residents at our community program are n track to graduate with certificates in robotic training. On average, the faculty at our hospital perform 5–10 robotic case weekly. This allows for extensive exposure to robotic training from the beginning of residency over the five-year training program. Additionally, it is seen that with this curriculum in place, residents are gaining autonomy at a faster pace and able to perform more robotic procedures independently than prior to the creation of this program.

Conclusion: By developing a curriculum that is fully integrated within the surgical residency experience, all surgical residents are able to gain proficiency in robotic surgery and graduate with a certificate. This allows residents to be more marketable in the job field and also provides a unique set of skills that is vital for most surgical specialties.

P241

Educational Effectiveness of e-Learning Interventions for Practicing Surgeons: A Systematic Review

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Background: E-learning interventions are gaining popularity in surgical education for their cost-effectiveness, convenience, and accessibility. The self-paced nature of e-learning provides opportunities for practicing surgeons to participate in continuing professional development activities. We performed a systematic review of the literature to determine the educational effectiveness of available e-learning interventions for practicing surgeons.

Methods: We performed a comprehensive search of electronic databases (Ovid MEDLINE, Ovid MEDLINE Daily and Epub ahead of print) using broad search terms from 1994 to present. We set language limits to English and Spanish. We included studies assessing the educational effectiveness of e-learning interventions for practicing surgeons. We excluded studies involving surgical trainees and those not evaluating the educational effectiveness. Two independent reviewers assessed the studies for relevance and inclusion. We assessed the quality of the evidence using CASP tools. Two independent reviewers performed data abstraction and categorized educational outcomes using Moore's Expanded Outcomes Framework for Assessing Learners and Evaluating Instructional Activities.

Results: We retrieved a total of 1306 studies. After screening abstracts and titles, we excluded 1211 studies, reviewed 95 full-text studies, and selected 15 studies for inclusion in our review. We rated 13/15 studies as moderate (8) or strong (5) in study quality. Most E-learning interventions involved self-paced multi-media modules. All educational outcomes were Level 2 or higher on Moore's framework. Nine studies assessed for surgeons' satisfaction with an e-learning intervention (Level 2). Nine studies reported declarative knowledge gains (Level 3a) and 6 studies reported procedural knowledge gains (Level 3b). Four studies assessed surgeons' competence in an educational setting (Level 4), while two studies reported a change to surgeons' practice as a result of the intervention (Level 5). No studies reported changes in patient health and community health after the e-learning intervention (Level 6 and 7).

Conclusion: E-learning interventions improve surgeons' knowledge, competence, and can change their practice. Further research is required to demonstrate improvements in patient and community health.

P242

Removal of Ingested Open Safety Pin

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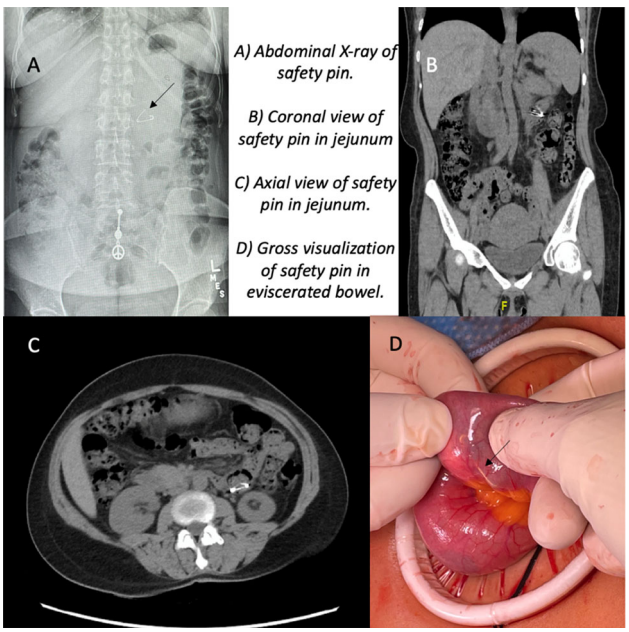
Introduction: Approximately 80–85% of ingested foreign bodies (FB) can be naturally passed, 15–19% will need endoscopic retrieval, and only 1% require surgical intervention. High-risk FB with sharpened edges may preclude passage or cause a perforation. Patients with ingested high-risk FB should be evaluated and managed expeditiously as there is a limited timeframe until the FB progresses distally necessitating surgery. This case presentation illustrates the lack of aggressiveness towards ingestion of high-risk FB that led to distal mobilization and implications for surgical management via a minimally invasive approach.

Case Description: 46-years-old female presented after accidentally ingesting a safety pin. Abdominal x-ray demonstrated 2-cm open safety pin within the gastric antrum. While awaiting in the ED for a CT-scan, the FB had progressed to the distal jejunum necessitating a surgical consultation. Diagnostic laparoscopy was performed; however, the object was not visualized after running the bowel. Intraoperative fluoroscopy was thus utilized, capturing intermittent images while concurrently running the bowel with successful localization of the FB. A mini lower-midline laparotomy was made and the jejunal loop was exteriorized via laparoscopic bowel graspers. A small enterotomy was made on the anti-mesenteric side allowing for safe extraction of pin. The enterotomy was primarily closed and placed back into the abdomen. The procedure and post-operative course were benign with patient discharged on POD2 without complications upon follow-up.

Discussion: High-risk FB may cause perforation, obstruction, or visceral injury. Prompt evaluation and management is imperative as less invasive procedures can be swiftly successfully pursued in early presentation. In this case, excessive time had elapsed and the FB advanced distally hindering endoscopic extraction. Upon literature review, a stepwise approach is indicated for high-risk FB with initial recommendations prioritizing minimally invasive options, such as esophagogastroduodenoscopy. If endoscopy fails, laparoscopy should be attempted with intraoperative fluoroscopy; conversion to open laparotomy is indicated if laparoscopic retrieval is unsafe or unsuccessful. Evidently, minimally invasive procedures have proven to be effective with fewer complications, and shorter length-of-stay, hence, it is crucial that surgeons be adequately trained in these techniques as this is not an uncommon problem that many surgeons will encounter in their career. This case, though not novel, exemplifies the importance in laparoscopic skills that the Fundamentals of Laparoscopy(FLS) certification mandate. For example, this patient may have benefited from a completely laparoscopic surgery if the enterotomy was made and repaired intracorporeally although length-of-stay was only two days without complications by our approach.



P244

Colon Preservation in the Era of the Surgical Endoscopist- A Case Series of a Cohort of Patients from Barbados

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Background: Endoscopic resection has been a common procedure for the removal of simple colorectal polyps for decades. Subsequently more advanced procedures were developed to treat more complex rectal polyps and currently with advancements in endoscopic equipment the difficult colonic polyp can now be resected with combined laparoscopic and endoscopic procedures.

Case Report: We report on our initial experience utilising colonoscopic assisted laparoscopic wedge resection (CAL-WR) for the removal of benign complex colonic polyps at a laparoscopic center in the island of Barbados. The case report involves three patients with caecal polyps who were referred to surgery for colectomy. These patients were deemed appropriate for colon preservation given the size of the lesion, the benign histologic diagnosis and the location of the lesions within the caecum. All cases were performed by the same surgeon under general anaesthesia without complication and the patients were discharged the following day. Subsequent histology confirmed benign pathology in all patients.

Discussion: Colon preservation is a feasible option for patients with benign colorectal polyps. CAL-WR is an appropriate procedure for these patients because no additional advanced endoscopic skills or equipment are required.

P245

Intracorporeal Anastomosis Helped to Obtain Qualified Resection Margin During Laparoscopic Radical Resection of Transverse Colon Cancer: A Retrospective Single-Center Study

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Background: The approach of anastomosis in laparoscopic resection of transverse colon cancer (TCC) has rarely been discussed. This study aimed to compare the resection margin of TCC with extracorporeal anastomosis (ECA) versus intracorporeal anastomosis (ICA).

Methods: A single-center retrospective study was performed by including patients who underwent laparoscopic resection of TCC from July 2019 to July 2021. According to the approach of anastomosis, patients were divided into two groups, ECA group and ICA group respectively. The clinical characteristics, the perioperative outcomes and the pathological results (especially the length of resection margin) were compared between the two groups. The length of two-sided resection margins (long margin, short margin) was measured on formalin-fixed specimens and those with short margin less than 4.0 cm were defined as unqualified specimens.

Results: 117 TCC patients were included: 94 (80.3%) in ECA group and 23 (19.7%) in ICA group. The median length of long margin and the total length of two-sided margins were significantly longer in the ICA group (18.0 (13.0–23.5) vs. 14.0 (9.0–19.0) cm, $p = 0.011$; 24.0 (18.0–30.5) vs. 20.0 (13.9–25.1) cm, $p = 0.010$; respectively). The median length of short margin was also longer in the ICA group but the difference was not statistically significant (6.0 (3.5–8.0) vs. 4.5(3.5–7.0) cm, $p = 0.120$). However, the proportion of unqualified specimens in ECA group was 48.9% (46/94), remarkably higher than that (26.1%, 6/23) in ICA group ($p = 0.048$). There was no significant difference in the median operation time (142.0 vs. 130.0 min, $p = 0.078$), the duration of hospital stay (14.0 vs. 13.0 d, $p = 0.514$) and the postoperative complication rate (8.7% vs. 6.4%, $p = 0.694$). No significant difference was observed in the median number of harvested lymph nodes (20.0 vs. 17.0, $p = 0.115$) between the ICA and ECA groups.

Conclusion: ICA resulted in longer resection margin and less unqualified specimens in laparoscopic resection of TCC. However, this should be verified by large sample-size multi-center studies and the oncological impact of longer resection margin needs to be further investigated.

P246

Uncovered Metal Duodenal Stents can Effectively be Used to Manage Gastric Outlet Obstruction in the Setting of Gastric Lymphoma

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Introduction: Most of the literature on the use of stenting for the management of malignant gastric outlet obstruction is for palliation and often amalgamates multiple pathologies. Patients with gastric lymphoma and gastric outlet obstruction often have a favorable prognosis and are frequently treated with curative intent. Many endoscopists avoid placement of uncovered stents despite their favorable anti-migration properties for fear that following completion of lymphoma therapy they may cause significant morbidity.

Methods and Procedures: A retrospective review was performed for all patients undergoing endoscopic stenting for the management of non-palliative gastric outlet obstruction from April 2014 to August 2021. The cases where uncovered metal stents were used for patients with non-palliative lymphoma are presented.

Results: 6 cases of endoscopic stenting were identified for non-palliative gastric outlet obstruction of which 2 involved the use of an uncovered metal stent in the context of gastric lymphoma. Pre-stent BMI range was 13.4—13.7. Prior to stenting, 3–5 cycles of systemic therapy had been received and 2–4 gastroscopies (with or without dilation) were performed with minimal effect. Following stenting, oral intake was tolerated in both cases facilitating discharge and further systemic therapy was not delayed. Follow up ranged from 129 to 708 days with an increase in BMI of 5.2–6.8. Stents were indwelling at the time of analysis in both cases with no requirement for surgical management. One re-intervention was required for tissue ingrowth at 59 days which was managed with outpatient endoscopy and placement of a fully covered stent within the uncovered stent.

Conclusion: While many experts feel that endoscopic stenting with uncovered metal stents should be avoided in patients with obstructing gastric lymphoma being treated with curative intent, these patients are often high-risk surgical candidates secondary to active chemotherapeutic treatment and profound malnutrition. Uncovered metal stents offer a reliable means of restoring enteral nutrition with the advantage of faster return of function and decreased interruption of curative therapy and should be considered as an option in the management of gastric outlet obstruction secondary to gastric lymphoma.

P247

Rendezvous Methods Combined Double Balloon Enteroscope for Dilatation in Hepaticojejunostomy Reconstruction After Bile Duct Injury: A Case Report

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Iatrogenic bile duct injury (BDI) remains a potentially devastating complication after cholecystectomy. For most major BDIs, the biliary-enteric reconstruction surgery is required. However, hepaticojejunostomy anastomotic stricture, a significant long-term complication after biliary reconstruction surgery, can be occurred and advanced treatment modalities are generally needed. We present the successful treatment of a hepaticojejunostomy anastomotic stricture patient with biliary stenting by the rendezvous technique via a percutaneous approach combined endoscopic retrograde cholangiography (ERC) using a double balloon enteroscope (DBE).

P248

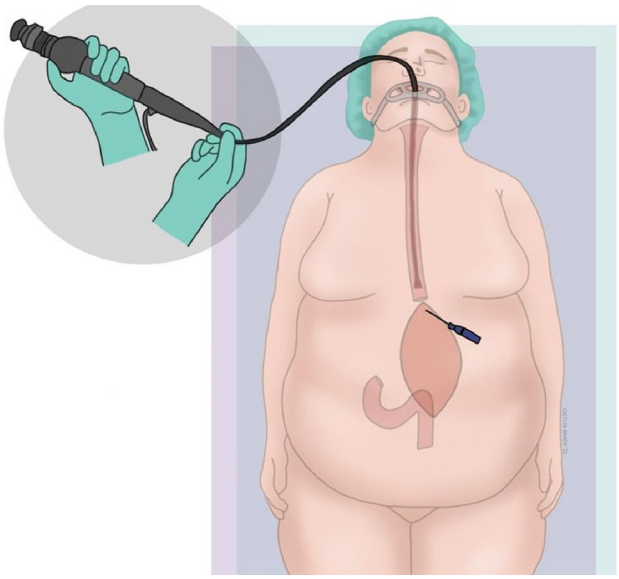
A Novel Approach to the OrVilTM Circular Stapler for an Esophagojejunostomy Anastomosis

John F Curtis, MD; Alexandra M Falvo, MD; Ryan D Horsley, DO; Anthony T Petrick, MD; Geisinger

Intro: Reconstruction of esophagojejunostomy after total gastrectomy is a technically challenging procedure. There are multiple described techniques for both open and laparoscopic approaches, however, there is no currently described endoscopically guided technique. Foregut, thoracic and general surgeons can use previously developed endoscopic technical skills to facilitate esophagojejunostomy anastomoses in difficult cases.

Case Description: We present a case of 73 year old female with known paraoesophageal hernia, transferred to a tertiary facility with mesoaxial volvulus resulting in obstruction and ischemic necrosis of the stomach. The patient required emergent total gastrectomy with delayed reconstruction. The initial procedure was performed laparoscopically and converted to open due to poor visualization. After a 48 h period of resuscitation she returned for an esophagojejunostomy with roux en y reconstruction and jejunostomy feeding access. At the subsequent procedure, it was noted that the esophageal stump did not reach the hiatus and a standard OrVil placement was not technically feasible. Therefore, Endoscopic guidance was used to assist in the placement of the OrVil anvil. A large bore angiocath was used to puncture the distal esophageal stump under direct endoscopic visualization, a soft suture was inserted through this, grasped with forceps and pulled out of the mouth similar to the Gauderer-Ponsky technique (Figure A). The OrVil was then attached to the suture and pulled through the mouth and esophagus through the distal stump. This created a snug fit around the anvil which was then connected to the EEA stapler in the standard fashion.

Discussion: There are no previously reported cases of endoscopic guidance for Orvil placement. This is a useful technique for use in the creation of difficult anastomoses. It utilizes already developed endoscopic skills in a novel way. Furthermore, it's possible that by using this endoscopic guided technique, the size of the esophagotomy is limited with potential to improve tissue apposition and decrease leak rate. In the future, the use of endoscopic assistance for OrVil placement may be applicable to both open and laparoscopic procedures.



P249

Management of Gastrointestinal Defects Using a Novel Endoscopic Helical Tacking System; a Case Series

Antoinette Hu, MD[1]; Travis Edmond, BS[2]; Joshua S Winder, MD[1]; Eric M Pauli, MD[1]; [1]Penn State Health Milton S. Hershey Medical Center; [2]Penn State College of Medicine

Background: Gastrointestinal tract defects (GITD) are traditionally repaired surgically. More recently, endoscopic defect closure has emerged as a non-invasive management strategy. Defect closure options such as over-the-scope clips and endoscopic suture have been extensively studied. More recently, a novel endoscopic helical tacking system (EHTS) has been approved. Here, we review our initial experience utilizing an EHTS to manage GITD.

Methods: After IRB approval, a retrospective analysis was conducted of all adult and pediatric patients who underwent GITD management with the EHTS (X-tack^{TM}, Apollo Endosurgery, Texas) between 2020–2021 at our institution. Patients undergoing EHTS use for non-GITD indications were excluded. The device consists of 4 independent helical tacks connected via a 3–0 polypropylene suture. Tissue approximation occurs as the suture is tensioned and cinched in place. Our primary endpoint was definitive endoscopic closure, defined by the absence of radiographic or clinical evidence of the defect during follow up.

Results: Nine patients with GITD undergoing EHTS management were identified. The mean age was 53.8 years old (ranging from 14 to 73 years old), the mean BMI was 25.5 kg/m2, and 66.7% were male. GITDs included 3 (33.3%) leaks and 6 (66.7%) fistulae. Seven (77.8%) of the defects were in the upper GI tract. Six (66.7%) of the defects are chronic and 3 (33.3%) were acute. An average of 1.4 EHTS and 5 tacks were used per defect closure, including one outlier patient needing 3 EHTS with 12 tacks. The mean total operation time was 73.4 min. Two patients required a second EHTS intervention. There were two separate technical failures; one broken suture and one malfunctioning tack. Immediate technical success was achieved in 100% of cases and long-term success in 33.3%, with mean follow up of 4 months. Six patients had other endoscopic interventions prior to the EHTS, including over-the-scope clip placement and endoscopic suturing. Three patients required subsequent endoscopic interventions to achieve defect closure. No patients required definitive operative procedures. One patient had a post-operative G-tube balloon rupture by a tack requiring replacement with a non-balloon gastrostomy tube.

Conclusion: The EHTS can be safely utilized to endoscopically close GI fistulas and leaks not amenable to other closure methods. Its unique deployment method offers advantages over previously evaluated endoscopic methods. As such, EHTS use should be considered before pursuing more invasive surgical options.

P250

Hepatic Gastrostomy Guided by an Endoscopic Eco Secondary to a Stenosis in the Hepatic Jejunum Anastomosis in Roux-en-Y. A Case Report

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We Present the case of 21-year-old female patient that was treated in a medical unit of the third level Mexico City for a stenosis of the Hepatic jejunum anastomosis in Roux-En-Y. The objective of this job is to present the approach of the diagnostic and treatment guided by the ENDOSCOPIC ECO.

The patient had a history a disruption of the Biliary Tract (Strasberg E2) (Amsterdam Bergman Type D), the patient was subjected to a Hepatic jejunum anastomosis to 40 cm from fixed loop jejunum-jejunum anastomosis to 80 cm loop fixed in Roux-En-Y in the year of 2019, staying asymptomatic for 2 years. In March of this year, the patient began to show symptoms compatible with an obstructive pattern of the icteric syndrome and moderate cholangitis, on which a percutaneous cholangiography is performed showing a hepatic-jejunal stenosis, reason for which a percutaneous multipurpose catheter 10fr is placed with success; with catheter replacement in 3 months, In June, it attends for new percutaneous procedure without achieving success; it is scheduled for an endoscopic procedure by Spyglass in the same hospitalization, without achieving success, it is then decided to program a hepato gastric biliary bypass by an ECO Endoscopy plus placement of a metallic Biliary prosthesis 10mmx 8 mm procedure by which was a successful.

Patient is discharged at 48 h asymptomatic, with no evidence of systemic response, with control of an Endoscopy and general surgery.

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Zenker's Diverticulostomy Using Per Oral Endoscopic Myotomy (Z-POEM): A Retrospective Multicenter Study

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Introduction: Zenker's diverticulum is a rare disorder present in 0.01–0.11% of the US population. Traditional methods of surgical management include open diverticulectomy, endoscopic stapled diverticulectomy or endoscopic CO2 laser cricopharyngeal myotomy. Recently, the advent of a Zenker's Diverticulostomy using a Per Oral Endoscopic Myotomy technique (Z-POEM) has been developed where initial reports demonstrate decreased perioperative morbidity as well as the ability to extend the myotomy along the posterior esophageal muscle to decrease recurrence. This multicenter study sought to evaluate patients undergoing Z-POEM and their outcomes.

Methods: A retrospective review of all patients undergoing Z-POEM was performed for two hospitals: Baylor University Medical Center (BUMC) and Methodist Medical Center (MDMC). We evaluated patient demographic information as well as preoperative and post-operative outcomes between the two institutions. Statistical analysis involved Fisher's exact test for categorical variables, and Student's t-test for continuous variables. Paired t-test was used to assess changes in Functional Oral Intake Score (FOIS) from baseline to one month follow-up. A higher FOIS relates to better functional oral intake.

Results: There were a total of 21 patients included in this study, 13 from MDMC and 8 from BUMC. 66% of patients from combined groups were male. Over half of the patients undergoing this procedure were categorized as ASA 3 (52.4). Overall Functional Oral Intake Scale (FOIS) scores completed preoperatively with an average score of 5.0. All of the patients involved in the study reported dysphagia, 85% reported regurgitation, only 33% reported weight loss, 29% reported choking and 14% reported aspiration. Initial diverticulum size was 35.2 mm. The average FOIS score 1 month post-operatively was 6.6, and it significantly increased by about 1.6 from baseline ($p = 0.001$). At one month follow-up, 95% of patients reported resolution of dysphagia and 84.2% had complete resolution of all symptoms. There were no post-operative complications reported in the study cohort.

Conclusions: Z-POEM is evolving as a safe and efficacious treatment modality for patients suffering from Zenker's diverticulum. Short term outcomes of this endoscopic treatment of Zenker's diverticulum are effective, but more long-term studies are needed.

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Stent Repair of Esophageal Perforation at the Upper Esophageal Sphincter Following Transesophageal Echocardiography

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Introduction: Transesophageal echocardiography (TEE) is a diagnostic tool that is widely used in clinical cardiology. However, the introduction of a probe into the esophagus can cause iatrogenic esophageal perforation and fistula formation with an estimated incidence of 0.03 – 0.09%. Here, we describe a case of echocardiography-induced perforation at the upper esophageal sphincter that was treated endoscopically with stent placement.

Case Report: An 82-year-old female with a history of coronary artery disease, mitral valve regurgitation, and chronic obstructive pulmonary disease was transferred from an outside hospital to our institution's intensive care unit after an upper esophageal perforation following TEE. The defect was located 15 cm distal to the incisors and ended in a blind pouch at 40 cm distally. Initial upper GI study did not show any passage of contrast through the distal lower esophageal sphincter.

Esophagogastroduodenoscopy was used to cannulate the native esophagus, and a fully covered stent was placed over the perforation while placing radial pressure, re-approximating the mucosa back onto the muscle over the length of the blind pouch. Patency of the esophagus and seal of the defect was checked, and the scope was withdrawn. Of note, this was a high esophageal stent with a distal landing zone 15 cm from the incisors. While this location is thought not to be tolerated well, our patient tolerated extubation. She was kept on aspiration precautions. The stent was in place for five days, and the patient endorsed neck and chest spasmodic pain. At post-operative day 5 the stent was removed, and the perforation was sealed with no ability to enter the false passage with a patent esophagus. Barium swallow confirmed closure of the false passage. The patient completed an antibiotic course, consumed food at discharge, and improved over several weeks.

Discussion: Current approaches to esophageal perforation are non-operative, endoscopic, or primary surgical repair. Recent studies have shown the safety and efficacy of endoscopic repair for esophageal perforation with self-expandable metallic stents (SEMS). Various case reports tout positive outcomes in managing TEE-induced perforations with endoscopic stenting. We show high esophageal stent placement can be tolerated from a pain and airway perspective, even though it was previously thought there was aspiration risk since the upper esophageal sphincter is held open. This location was tolerated, yet aspiration precautions must be observed.

Conclusion: This case report lends additional evidence to the successful use of endoscopic stent repair for TEE-induced upper esophageal perforations.

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Its Time for a New Hiatal Hernia Classification. Should Degree of Gastric Herniation Be a Factor?

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Background: The current classification system for hiatal hernias (HH) has existed for over 70 years. Despite this, there is no correlation between how HH are described with clinical outcomes. Multiple methods have been proposed, but they failed to establish a valuable metric to quantify a HH. In this study we aim to evaluate whether intraoperative volume of herniated stomach is associated with postoperative outcomes and quality of life (QoL).

Methods: We conducted a retrospective review of patients who underwent a laparoscopic HH repair at our institution from September 2016 to April 2021. Intrathoracic stomach volume was estimated by a single surgeon with over twenty-five years of experience in laparoscopic HH repairs. These measurements were recorded and extracted from each operative report. Based on our operative findings of intrathoracic stomach herniation, patients were distributed into three groups: $< 30\%$ intrathoracic stomach, 30–50% intrathoracic stomach, and $> 50\%$ intrathoracic stomach. In addition, three validated surveys for (QoL) outcomes: RSI, GERD-HRQL, and SWAL-QOL were administered preoperatively and at 1, 6, and 12 months follow-up.

Results: Our study enrolled 558 patients during the study period. The majority of patients (42%) were classified as having over 50% of their stomach being intrathoracic. Across the three groups, statistically significant differences in demographics and co-morbidities were observed, with a trend towards higher age and rates of hypertension, hyperlipidemia, coronary artery disease, history of myocardial infarction, and arrhythmias in patients with more intrathoracic stomach ($p < 0.05$). In addition, those patients were more likely to undergo a Collis Gastroplasty ($p < 0.001$) and have longer operative times ($p < 0.001$). There was no significant difference in complication rates except for a higher incidence of reoperation with the $> 50\%$ intrathoracic stomach group. All groups experienced significant improvements in QoL outcomes postoperatively. Patients with $< 30\%$ intrathoracic stomach demonstrated higher symptom burden at one month postoperatively on all QoL measures ($p < 0.05$) but this difference did not remain at 6 or 12 month followup.

Conclusions: We demonstrate that large HH ($> 50\%$ intrathoracic stomach) are significantly associated with longer operative times, length of stay, and reoperation rate. In addition, early postoperative QoL was higher in patients undergoing repair of medium and large defects, this difference disappears at subsequent follow-up visits. Our novel method of characterizing HH is relevant in a clinical setting, and should be a factor in the development of a new classification system.

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Complications of Per-Oral Endoscopic Myotomy: Experience from a Single High-Volume Center

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Introduction: Per-oral endoscopic myotomy (POEM) has gained traction as a minimally-invasive alternative to the Heller myotomy and fundoplication in the treatment of achalasia and other esophageal dysmotility disorders. Several studies have demonstrated its safety and efficacy. However, literature reporting the adverse events (AE) associated with POEM is limited and inconsistent. This study aims to present the major AE and their management strategies encountered in our POEM series, and to review the literature regarding the incidence and management strategies of other reported AE.

Methods: This is a retrospective review for AE according to American Society for Gastrointestinal Endoscopy (ASGE) criteria in consecutive POEM cases performed at a high-volume tertiary referral academic medical center. We then performed a keyword literature search for AE of POEM with predefined selection criteria. AE data were aggregated by diagnosis, and graded according to ASGE criteria.

Results: 126 POEM cases were identified from June 10, 2011 – July 19, 2021. Overall AE rate was 14/126 (11.1%). There were two severe AE: cardiac arrest from capnopericardium, and necrosis of the esophageal wall requiring esophagectomy. Moderate AE included two cases of submucosal tunnel hemorrhage requiring repeat endoscopy. Together, moderate-to-severe AE were encountered in 4/126 cases (3.2%) and considered clinically significant. In 10/126 cases, mucosal injury occurred and was treated with endoscopic clips. These were considered mild AE as they were clinically insignificant and did not preclude completion of the case. There were no fatalities.

Initial review of the literature identified 118 articles. Twenty-nine were ultimately selected for data analysis, which included 5079 patients. The incidence of overall, moderate-to-severe, and minor AE were 31%, 2.4%, and 29%, respectively. There were multiple reported AE and management strategies that were not captured within the ASGE criteria.

Conclusions: POEM remains a safe and effective procedure with an acceptable overall AE rate and low incidence of clinically significant AE in experienced hands. Moderate-to-severe AE rates in our series are consistent with the published data. However, reporting of AE in the literature is widely inconsistent. We posit that AE are likely under-reported, and those that are reported vary widely in definition and severity. Specifically, minor AE may not be captured accurately because they are rarely clinically relevant or fit into existing grading systems. This highlights the need for an AE lexicon that captures POEM's unique characteristics and encourages accurate identification and reporting of the AE that pertain to it.

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Case Report: Esophageal Necrosis and Perforation Presenting as Intractable Hiccups

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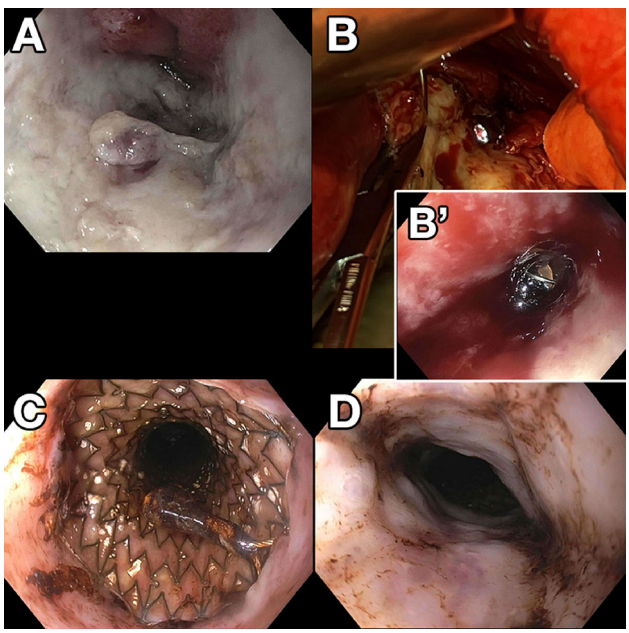
Introduction: Esophageal necrosis is a rare disorder with less than 200 reported cases in the literature, with rates of perforation 5%, stenosis 9%, and mortality 32%. Patients typically present with symptoms of hematemesis and melena.

Case Description: A 52-year-old male with a history of alcohol abuse, LA grade D esophagitis, hiatal hernia, and chronic hiccups (managed with baclofen, pantoprazole, and thorazine) presented with 5 days of intractable hiccups attributed to running out of thorazine. He presented febrile to 38.1C, tachycardic to 120 s, with a leukocytosis to 13, lactate of 5.8, and an acute kidney injury. A CT of the abdomen showed a hiatal hernia with thickening of the lower esophagus and edematous stomach with peri-gastric pneumoperitoneum. An emergent exploratory laparotomy showed no evidence of gastric perforation, a negative air leak test (via nasogastric tube at 40 cm and 55 cm), and no obvious distal esophageal defect. Intraoperative EGD found circumferential esophageal necrosis spanning 25 to 40 cm from the incisors (**A**) with an anterior 1-cm mural defect abutting the GE junction (**B, B'**). A covered metal esophageal stent was placed by gastroenterology (**C**) and reinforced with an omental patch by general surgery. A nasogastric tube was left to drain the stomach and a feeding jejunostomy tube was placed in anticipation of prolonged NPO status. Wide drainage was achieved with a JP drain and bilateral chest tubes. Antibiotics and antifungals were continued for two-weeks. At 4 weeks post-operatively, an EGD showed a healed perforation with improving esophagitis but with stenosis at 25 to 28 cm (**D**), requiring replacement of a covered stent. At 11 weeks, repeat EGD showed significant fibrosis and stenosis distal to the previous stent, requiring addition of a second stent.

Discussion: The etiology of esophageal necrosis is controversial and multifactorial, likely involving an acute triggering event in the setting of chronic comorbidities such as reflux, general debilitation, or ischemia. Management is primarily supportive with treatment of underlying conditions. In the case of perforation, prior case reports show survival after VATS repair or esophagectomies. This case illustrates a unique presentation of intractable hiccups, with esophageal perforation successfully managed by endoscopic stenting and wide drainage.



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Our Standard Procedure with Right Side Approach in Laparoscopic Nissen Fundoplication for GERD Patients

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Introduction: Laparoscopic techniques in anti-reflux surgery for GERD patients are still considered complicated. We have established our simple anti-reflux surgery procedure with right side approach contributing to less bleeding and less operative time.

Surgical Procedure:

Setting

Our 5-trocar setting with patients in the reverse Trendelenburg's position is as follows: 12 mm trocar just below the navel (A), 5 mm trocar at the upper right abdomen for pulling up the liver, 5 mm trocar at upper right, 12 mm trocar at upper left (B), 5 mm trocar at middle left (C).

Step 1: Right Side Approach

Left part of the lesser omentum was cut with preserving the hepatic branch of vagus nerve. The right crus of the diaphragma has been dissected free from the soft tissue around the stomach and abdominal esophagus. In this step the fascia of the right crus should be preserved and the soft tissue should not been damaged to avoid unnecessary bleeding. After cutting the peritoneum just inside the right crus, the soft tissue was dissected bluntly to left side. Then the inside and outside margins of the left crus of the diaphragma were recognized from the right side. The laparoscope uses trocar (A), the assistant uses trocar (B) to pull the stomach and the operator's right hand uses trocar (C).

Step 2: Flap Preparation

The branches of left gastroepiploic vessels and the short gastric vessels were divided. The left crus of the diaphragma was exposed and the window at the posterior side of the abdominal esophagus was shown and widely opened. The laparoscope uses trocar (A) at the beginning of dividing left gastroepiploic vessels, trocar (B) when dividing short gastric vessels.

Step 3 Suturing

The right and left crus are sutured with interrupted stitches to reduce the hiatus. From the right side, the fundus of the stomach is grasped through the window behind the abdominal esophagus. Then the fundus of the stomach is pulled to obtain a 360 degree "stomach-wrap" around the abdominal esophagus. Stitches are placed between both gastric flaps.

Results: We have performed this procedure in 127 cases. The mean operation time in recent 20 cases is 67 min. The patients are mostly satisfied with the postoperative results because of stable food passage and no reflux.

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Post-Operative Symptoms and Quality of Life After Laparoscopic Paraesophageal Hernia Repair

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Introduction: Paraesophageal hernia repair (PEHR) can be challenging and has known high recurrence rate. Biologic mesh has been shown to reduce short-term but not long-term recurrence but the impact of mesh on quality of life and post-operative symptoms is unclear. The aim of this study was to evaluate outcomes of laparoscopic PEHR comparing primary repair (PR) vs. biologic mesh repair (MR), based on quality of life and post-operative symptoms.

Methods: We identified all patients who underwent first-time laparoscopic PEHR between October 2015 and October 2019 at our institution who had a minimum postoperative follow-up of 6 months. Mesh was used selectively and at surgeon's discretion in larger or technically challenging hernias. A standardized symptom questionnaire was administered using a scaled 0 to 10 score for severity, and 0 to 4 for frequency for postoperative symptoms.

Results: 95 patients underwent PEHR during our period of study, including 65 (68%) PR and 30 (32%) MR. There were no differences in baseline characteristics. Median follow-up was 226 days (7.5 months). We obtained a postoperative upper gastrointestinal (UGI) study in 92% of the PR group and in 97% of the MR group. Radiologic recurrence was statistically higher in the PR compared with MR repair (32% vs. 21%, $p = 0.04$).

There was no significant difference between PR and MR groups in postoperative symptom frequency or severity. We compared the outcomes of patients with a recurrent hernia with those without a recurrence. Every symptom except chest pain was significantly more severe in those with recurrent hernias (**table**).

Symptom	No Recurrence	Recurrence	*p* value
Heartburn	1. 1± 2.2	2.5 ± 2.9	*0.01*
Regurgitation	0.8 ± 1.9	2.3 ± 2.6	*0.003*
Dysphagia	1.0 ± 2.1	2.3 ± 2.9	*0.01*
Chest pain	0.9 ± 2.0	1.8 ± 2.9	0.08
Bloating	1.3 ± 2.2	2.6 ± 3.2	*0.03*
Abdominal pain	1.0 ± 1.9	2.6 ± 3.2	*0.004*
Diarrhea	1.34 ± 2.2	2.5 ± 3.2	*0.03*
Values are mean ± SD. *Symptom severity scored by scale 0 –10			

Conclusions: Post-operative GI symptoms rarely caused frequent or daily impact, and there was no difference in these symptoms between primary and mesh repair. These findings demonstrate that mesh reinforcement of the hiatus reduces short-term recurrence and is not a predictor of poor postoperative symptomatic outcomes. Patients without recurrence have better clinical outcomes, indirectly supporting the use of mesh for short-term outcomes.

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The Relationship Between Number of Proximal Events on Esophageal Impedance and Laryngopharyngeal Symptom Improvement After Anti-reflux Surgery

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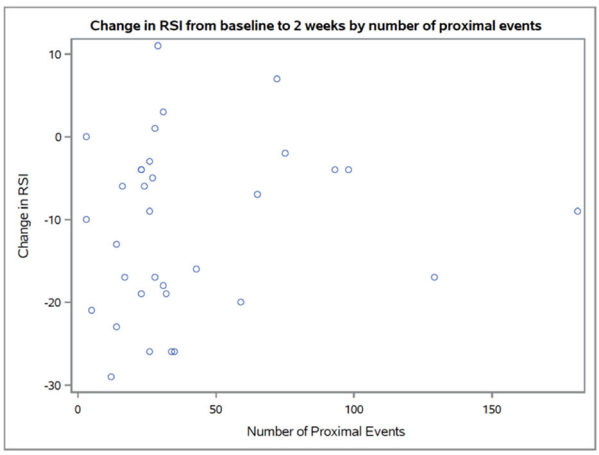
Background: It has been previously described that patients with laryngopharyngeal reflux (LPR) symptoms improve after anti-reflux surgery (ARS). It is not clear whether proximal events noted during esophageal impedance testing can predict LPR symptoms. The goal of this study was to see if the number of proximal events predicted the degree of symptom improvement after ARS.

Methods: Patients who underwent primary ARS between January 2009 and June 2021 were identified from a single-institution database. Patients were included if they had undergone a preoperative impedance study and had answered a preoperative and 2 week postoperative Reflux Symptom Index questionnaire (RSI) (n = 33). The median number of recorded proximal events on impedance testing was 28, which was used as a marker to dichotomize patients into "Low" or "High" groups. Baseline characteristics were compared between groups using Wilcoxon Rank Sum and Fisher's exact tests. The primary outcome was the change in patients' RSI score from pre- to post-operative. A scatter plot was created to assess the relationship between the change in RSI score and number of proximal events on impedance test.

Results: There were 16 patients included in the "Low" events group and 17 patients in the "High" events group. Both groups were similar in age (p = .59), sex (p = 0.08), race (p = 1.0), and body mass index (p = 0.81). The mean preoperative DeMeester Score was similar in both groups (p = 0.43). All but 3 of the patients were on a PPI prior to surgery (p = 1.0). The Low events group had a mean decrease in their RSI score of 12.2 points. The High events group had a mean decrease in their RSI score of 9.6 points. This was not statistically different (p = 0.48). The correlation coefficient between RSI change and number of proximal events was 0.14, but this was also not statistically significant (p = 0.43) (Fig. 1).

Conclusion: The number of proximal events was not correlated with the degree of improvement of RSI scores. This suggests that this measure may not be useful as a predictor of degree improvement after ARS. Notably, all but 5 patients had a decrease in RSI score, suggesting that patients with LPR symptoms and any number of proximal events on impedance study have a good response to ARS.

Figure 1:



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Age and Race Have A Significant Impact on Helicobacter Pylori Infection Risk

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Introduction: The objective of this study is to identify current patient risk factors associated with Helicobacter pylori (H. pylori) infection. During esophagogastroduodenoscopies (EGD), biopsies are routinely taken to be tested for H. pylori. This infection plays a major role in the development of gastritis, peptic ulcers, gastric adenocarcinoma, and lymphomas. However, recent data is lacking for patient factors related to H. pylori infection.

Methods: A prospectively collected retrospective analysis was conducted on all patients undergoing EGD with biopsy at a single institution between 2014 and 2015. Logistic regression and chi square analysis were utilized. Data are presented as median (mean $\pm$ standard deviation).

Results: Five hundred and nineteen patients from Manatee Memorial Hospital underwent EGD with biopsies. H. pylori infection was found in 53 patients (10%). The most common preoperative diagnosis in patients without H. pylori was abdominal pain (41%), followed by acid reflux (33%), other (24%) and ulcer disease (2%). Similarly for H.pylori patients, the most common preoperative diagnosis was also abdominal pain (54%) and acid reflux (25%) other (19%) and ulcer disease (2%). The majority of biopsies for patients without and with H. pylori demonstrated inflammation (esophagitis/gastritis/duodenitis) with 98% and 99% respectively followed by ulcer disease (2% vs 1%). Patients with H. pylori were found to be significantly younger, age 52 (51 $\pm$ 16) compared to those without H. pylori, age 58 (59 $\pm$ 15) ($p < 0.00$). Patients with H. pylori were also more likely to be black with 10/50 (20%) black patients having H. pylori compared to white patients with 34/429 (8%) ($p < 0.00$). There was no significant risk associated between H. pylori infection with personal history of peptic ulcer disease, smoking, diabetes, anticoagulation use, BMI, gender or alcohol use.

Conclusion: Younger age and black race were significantly associated with H. pylori infection. Patients with H. pylori infections were most likely to have a preoperative diagnosis of abdominal pain and a postoperative diagnosis of inflammation. We did not find a significant association between H. pylori infection and peptic ulcer disease.

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Gastro-Esophageal Reflux Test to Determine Surgical Indication for GERD Patients and Results of Laparoscopic NISSEN Fundoplication

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Introduction: The indication of laparoscopic anti-reflux surgery for GERD patients is difficult to be determined definitely.judged fairly. We have established "Reflux Test " as the tool to determinedecide surgical indication for GERD patients.

Surgical Indication:

Reflux Test

At the standing position a patient swallows 300 ml barium solution. After total solution goes into stomach, a patient lies down at the flat position. Then a patient changes the position to left lateral decubitus position, flat position, right lateral decubitus position and flat position again every 10 s in the order. During this procedure, gastro-esophageal reflux was evaluated and assigned to severe, moderate and slight category. If the reflux was observed slightly up to cervical esophagus, the case was assigned to moderate category. The anti-reflux surgery was considered in the moderate and severe categories.

Results: We have performed laparoscopic Nissen procedure in 127,107 cases. Median follow-up period of this study was 77 months (1–14,272 months (1–124 months). In 1815 cases (14.20%) PPI was restarted before 6 months after the anti-reflux surgery. In 3228 cases (2526.2%) PPI was restarted after the anti-reflux surgery during the whole follow-up period of this study. The results of the study have shown that the reflux esophagitis was improved obviously after the anti-reflux surgery even in the PPI restarted group which was analyzed by our endoscopic esophagitis grading score ($p < 0.001$).

Conclusion: The anti-reflux surgery is most effective for the patients who really have the obvious reflux. The results of the laparoscopic Nissen fundoplication were good and satisfied by the patients mostly.

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Impact of Robotic Approach On Post-Anastomotic Leaks After Esophagectomy for Esophageal Cancer

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Introduction: Though mortality rates after esophagectomy have decreased over the last thirty years, anastomotic leaks still commonly persist and portend significant morbidity. Previous studies have analyzed patient and perioperative risk factors for leaks, yet data describing the association of leaks and an open or minimally invasive approach are lacking. The purpose of this study was to evaluate the impact of operative approach on leak rates and subsequent management of the leaks.

Methods and Procedures: We queried the Procedure Targeted National Surgical Quality Improvement Program Database for patients undergoing esophagectomy for cancer in the years from 2016 to 2019. Patient demographics, disease-related information, perioperative data, and short-term outcomes were reviewed. Multivariable, stepwise logistic regression analysis was performed to investigate factors associated with post-operative anastomotic leaks.

Results: Of the 2,696 patients who underwent esophagectomy for cancer, anastomotic leaks occurred in 374 (14%). Based on approach, 13% of open, 14% of laparoscopic, 18% of robotic cases were complicated by leak ($P = 0.123$). Univariate analysis identified the following significant risk factors for leak: robotic approach (OR 1.46, $P = 0.042$), diabetes (OR 1.50, $P = 0.002$), hypertension (1.55, $P < 0.001$), and longer operative time (1.63, $P < 0.001$). On multivariable analysis, robotic approach was not an independent factor associated with leak (OR 1.16, $P = 0.439$); however, diabetes (OR 1.32, $P = 0.047$), hypertension (OR 1.32, $P = 0.022$), and longer operative time (1.61, $P < 0.001$) were. The percentage of leaks requiring endoscopic or operative intervention was 75% for open, 79% for laparoscopic, and 54% for robotic cases ($P = 0.004$).

Conclusions: Anastomotic leaks after esophagectomy for cancer occur frequently regardless of surgical approach. Furthermore, these leaks are managed differently after an open, laparoscopic or robotic approach. Robotic esophagectomies complicated by anastomotic leak required less invasive management. Given these findings, the focus on reducing anastomotic leaks should continue to focus on modifiable patient and operative-related factors.

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Clinical Outcomes of CDH-1 Mutation Carrier Patients Undergoing Open vs MIS Prophylactic Total Gastrectomy—The Mayo Clinic experience

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Background: Due to the high penetrance of hereditary diffuse gastric cancer in CDH-1 mutation carriers, prophylactic gastrectomy is recommended for patients and affected family members before age 40. We designed a study comparing the incidence of in situ or invasive gastric adenocarcinoma in preoperative endoscopic biopsy vs surgical resection specimens in CDH-1 mutation carriers who underwent open and MIS (laparoscopic or robotic) prophylactic gastrectomy at our institution.

Study Design: A retrospective review of 56 patients with CDH-1 gene mutations undergoing prophylactic total gastrectomy from January 2000 to January 2021 was conducted. Demographic information, preoperative endoscopic findings, postoperative pathology findings, and peri-operative outcomes were collected and analyzed.

Results: Preoperative endoscopic biopsy demonstrated in-situ cancer (Tis) in 2 patients (4.7%). All patients underwent total gastrectomy with Roux-en-Y reconstruction. Operative approach was MIS (laparoscopic or robotic) in 38 patients (67.9%) and open in 18 patients (32.1%). Surgical pathology demonstrated in-situ cancer in 5 specimens (11.6%) and invasive cancer in 11 specimens (23.9%). There were no significant differences in operative time, blood loss, lymph node yield, and short- or long-term major complication rates (including leak rates and stricture rates) between open and MIS groups. Overall perioperative major morbidity (Grade III-V) was 17.6% at 30 days and 19% at 90 days. No mortality was reported. Follow-up was available in 100% and 75% of patients in our study group at 30 and 90 days respectively.

Conclusion: Our study found that surgical pathology specimens had a 7.5-fold positivity rate for in-situ and invasive cancer when compared to endoscopic specimens. Early prophylactic gastrectomy thus remains preferable to serial endoscopic surveillance in CDH-1 positive patients. When comparing operative approaches, although length of stay was shorter in MIS group, there were no statistical differences in operative time, blood loss, lymph node yield and major complications.

Keywords: CDH mutation, hereditary gastric cancer, prophylactic gastrectomy, total gastrectomy, risk reduction.

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Does Bio-absorbable Mesh Reduce Recurrence Rates? A Meta-analysis

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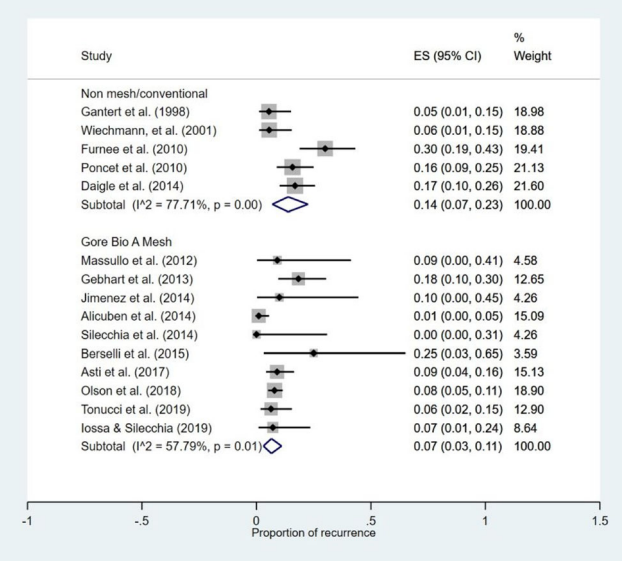

Introduction: The use of bio-absorbable mesh at the hiatus is controversial. There are two widely available meshes that can be placed during hiatal hernia repair. These are polyglycolic acid (PGA):trimethylene carbonate (TMC) and poly-4-hydroxybutyrate (P4HB) that are both considered bio-absorbable. The rates of resorption are 6 months and 12–18 months respectively. Both provide a "scaffold" for tissue ingrowth. But the long-term data is scant. We evaluated the world literature and performed a meta-analysis to determine if these meshes were effective in reducing recurrence.

Methods: A literature search was performed on PubMed. We evaluated for articles reporting on both PGA:TMC and P4HB used at the hiatus. We also included reports of non-mesh repairs for comparative reasons. The available extracted results on range and inter-quartile range were transformed into standard deviation to perform the meta-analysis. The DerSimonian-Laird random effects model was used to estimate the overall pooled treatment effect along with a 95% confidence interval (CI). Similar analysis was conducted to compare the clinical outcomes i.e., recurrence rate, mean surgical time, mean hospital stay and mean follow-up duration between non-Mesh and Mesh group. The I-square statistic was computed to assess the heterogeneity in effect sizes across the studies. An I-square of $> 70\%$ indicated a significant presence of heterogeneity across the studies. Publication bias was evaluated using Begg's test to assess if there is a significant correlation between the ranks of the effect estimates and the ranks of their variances.

Results: A total of 16 studies (10 mesh studies with 845 subjects and 6 non-mesh studies with 494 subjects) were included to conduct the meta-analysis. There was 1 article reporting outcomes on P4HB and 9 on PGA:TMC. Six studies in the non-mesh group were included. The proportion of recurrence proportion was found to be less in the mesh group at 0.07 compared to non-mesh group (0.14); however, the finding was not statistically significant. Length of stay was almost the same between the groups ($p = 0.77$). There tended to be a longer follow-up period in the mesh group (27.41 months vs 21.35 months). Surgery time was significantly shorter in the mesh group (127.89 min vs. 216.72 min; $p < 0.001$).

Conclusions: There was no improvement in recurrence rates using bio-absorbable mesh at an average follow-up of 29 months over the non-mesh group. PGA:TMC was reported 8 × more than P4HB and only had 17 months of follow-up. Further study of P4HB is needed.

P269

Operative Outcomes of Anti-reflux Surgery after Lung Transplantation

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Introduction: Anti-reflux surgery (ARS) is a definite treatment for gastroesophageal reflux. ARS has been shown to improve long-term allograft function after lung transplantation (LTx); however, data on perioperative outcomes of ARS in this population is limited. We report operative outcomes of ARS in lung recipients.

Methods: After IRB approval, we retrospectively reviewed our prospectively collected database for post-LTx ARS between 01/01/2015 and 01/31/2020. Perioperative outcomes, medical comorbidities, and pre-ARS esophageal function testing (high-resolution manometry [HRM] and esophagogastroduodenoscopy [EGD]) were reviewed. We also compared the outcomes to nontransplant patients undergoing ARS for gastroesophageal reflux during the same period.

Results: Forty-six post-LTx patients, including 4 after redo LTx, underwent ARS during the study period. All patients had bilateral LTx and the median interval between LTx and ARS was 9.1 months (IQR 5.9, 18.1). The median age and body mass index of lung recipients at the time of ARS were 63 years (56, 70) and 23.8 kg/m2 (21.2, 27.3), respectively. Preoperative HRM showed a manometric hiatal hernia (HH) in 76% (n = 35) of patients and esophageal motility disorder in 32% (n = 15) of patients. EGD showed HH (61%, n = 28), esophagitis (54%, n = 25), and Barrett's esophagus (24%, n = 11). The surgical technique was laparoscopic in 89% (n = 41) of patients and robotic in 11% (n = 5) of patients. The median operative time and length of stay for ARS were 85.5 min (74, 103) and 2 days (1, 4), respectively. Postoperative complications were seen in 8 (17.4%) patients (Table 1). The 30-day readmission rate (any reason) for LTx recipients was 13% (n = 6), whereas the 30-day readmission rate for nontransplant patients (N = 860) was 2.6% (n = 22).

Conclusion: ARS in LTx recipients was associated with low perioperative morbidity. However, 30-day admission was higher than in the nontransplant counterparts.

Table 1 Post-ARS complications in the included subjects

Postoperative Complication	No. of Patients
Clavien-Dindo class II	
Urinary tract infection	1
Urinary retention	3
Clavien-Dindo class IIIa	
Pneumothorax requiring chest tube reinsertion	1
Delayed conduit emptying requiring intervention (pyloric dilation, botox)	1
Dilation esophagus	1
New CNS event	1

P271

Impedance Planimetry (EndoFLIP) Assisted Laparoscopic Esophagomyotomy in Pediatric Population

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Introduction: Functional lumen imaging probe (EndoFLIP) is a diagnostic technology that assesses esophageal cross sectional area via impedance planimetry. The purpose of this study is to evaluate the utility of EndoFLIP intra-operatively during laparoscopic esophagomyotomy.

Methods: A review of all patients undergoing EndoFLIP assisted laparoscopic esophagomyotomy for achalasia between January 2021 and July 2021 was performed (n = 6). A retrospective review of 22 patients with achalasia that underwent traditional laparoscopic esophagomyotomy between July 2014 and September 2019 served as a control for comparison. Primary outcome was resolution of symptoms at discharge. Secondary outcomes included change in distensibility index (DI), operative time, length of stay, time to regular diet, and reinterventions.

Results: All patients managed with EndoFLIP assistance had resolution of dysphagia and postprandial vomiting following intervention. Average change in DI was 6.39 mm2/mmHg with a myotomy length of 4 cm. Operative time was shorter in the EndoFLIP assisted cohort than in the traditional method (90 min versus 185 min, $p = < 0.01$). There was no difference in length of stay ($p = 0.11$) or time to soft diet between groups ($p = 0.26$). All patients were discharged on postoperative day 1 tolerating a mechanical soft diet. No acid suppressive medications were prescribed to the study cohort during the observation period. Average length of follow up was 144 days; no patients required intervention for recurrent symptoms. Four patients in the control cohort required a reintervention within 1 year.

Discussion: Impedance planimetry (EndoFLIP) assisted laparoscopic esophagomyotomy results in similar short-term outcomes to traditional surgical technique. The EndoFLIP cohort had a shorter myotomy length, did not require fundoplication, and consequently had a shorter operative time.

P272

Bronchoesophageal Fistula Resolution via Bronchial Stenting in a Case of Metastatic Melanoma to the Mediastinum

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Introduction: We present the case of a malignancy-associated bronchoesophageal fistula (BEF) successfully managed with a metal left mainstem bronchial stent, after failure of esophageal stenting. Current guidelines recommend esophageal stenting as the foundation of management.

Case: The patient is a 48-year-old female with a past medical history of melanoma 27 years prior, now with metastatic posterior mediastinal 5.3 cm melanoma, on BRAF-targeted therapy. She was found to have endobronchial tumor in the bilateral bronchi and severe mass effect compression of the esophagus.

Throughout two months of admission, she underwent multiple bronchoscopies with laser ablation, and esophageal stenting, requiring multiple exchanges for stent migration and recurrent impactions. Tube feeds were initiated through percutaneous gastro-jejunal enteral access. The patient developed multidrug-resistant pseudomonal left lower lobe pneumonia for which she was treated with intravenous antibiotic therapy. During one esophagoscopic stent exchange, a new 8 mm esophageal-airway fistula was identified at 23 cm from the incisors. A 23 mm x 100 mm covered, metal EndoMaxx (Merit Medical) esophageal stent was placed. Esophagram demonstrated a stent leak. Subsequent bronchoscopy confirmed a fistulous connection with the left mainstem bronchus. The patient remained nil per os with tube feeds for two weeks until discharge.

The patient returned to the hospital two weeks after discharge with nausea, vomiting, fever and pleuritic chest pain. Computed tomography (CT) imaging of the chest demonstrated post-obstructive left lower lobe pneumonia and esophageal stent impaction. The stent was removed endoscopically, and a four-day follow-up esophagram demonstrated no leak. Despite a week of targeted antibiotic therapy, her symptoms persisted. Bronchoscopy demonstrated a pinpoint stricture in the left mainstem bronchus. The stricture was laser ablated and a 12 mm x 30 mm Aero (Merit Medical) covered metal bronchial stent was placed. Repeat esophagram four days later demonstrated patent BEF and distal migration of the bronchial stent. The stent was bronchoscopically upsized to a 12 mm x 40 mm Aero stent. The patient defervesced with resolution of tachycardia and leukocytosis by postoperative day three. She was discharged home with completion intravenous antibiotics.

Three-week esophagram demonstrated no fistulous leak. The bronchial stent was removed three months after placement. Follow-up esophagram confirmed BEF resolution. Interval six-week CT of the chest demonstrated no airway stricture and resolution of her pneumonia. She has had no recurrence of BEF after four months of monitoring.

Conclusion: We demonstrate the success of bronchial stenting without concurrent esophageal stenting for malignant BEF in a patient who failed esophageal stenting alone.

P273

Helicobacter Pylori is not a Leading Cause of Peptic Ulcer Disease

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Introduction: The objective of this study was to identify if Helicobacter pylori (H. pylori) infection is still a leading cause of peptic ulcer disease. Historically, H. pylori has been a major cause of peptic ulcer disease. Peptic ulcer disease continues to decline in the United States, primarily attributed to treatment of H. pylori, however, the current status of H. pylori induced peptic ulcer disease is not clear.

Methods: A prospectively collected retrospective analysis was undertaken for all patients undergoing esophagoduodenoscopy (EGD) with biopsy at a single institution between 2014 and 2015. Logistic regression and chi square analysis were utilized. Data are presented as median (mean ± standard deviation).

Results: Five hundred and nineteen patients underwent EGD with biopsies. H. pylori infection was confirmed for 53 patients (10%). Preoperative diagnoses for all patients who underwent EGD with biopsy were abdominal pain (41%), acid reflux (33%), other (24%) and peptic ulcer disease (2%). The preoperative diagnoses for patients found to have H. pylori were abdominal pain (54%), acid reflux (25%), other (19%) and peptic ulcer disease (2%). Inflammation (esophagitis/gastritis/duodenitis) was confirmed with pathology for 98% of patients without H. pylori and 99% of patients with H. pylori. Peptic ulcer disease was seen for 20% (102/519) of all patients undergoing EGD with biopsy. H. pylori was confirmed for 13% (13/102) of patients with peptic ulcer disease. Peptic ulcer disease was confirmed for 25% (13/53) of patients with H. pylori infection. There was no significant association between H. pylori infection and peptic ulcer disease (p = NS).

Conclusion: The vast majority of patients with peptic ulcer disease do not have H. pylori. There is no significant association between H. pylori infection and peptic ulcer disease in the modern era.

P274

Laparoscopic Repair of Recurrent Paraoesophageal Hernia After Prior Esophagectomy

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We demonstrate an elective operation for a large recurrent paraesophageal hernia after the previous repair with bio-absorbable mesh. She had an initial minimally invasive McKeown esophagectomy for squamous cell carcinoma. Laparoscopic findings included intrathoracic contents of colon and small bowel. After intestinal reduction, cruroplasty was performed with multiple interrupted sutures. An onlay mesh was then placed and secured. Omentopexy was subsequently performed to create a barrier against re-herniation of intraabdominal viscera. Her remaining postoperative course was uneventful. A subsequent surveillance follow-up CT revealed a fully re-expanded lung and reduced intraabdominal contents.

P275

Bacterial Colonization of the Stomach with Relation To PPI Consumption and Gastric pH, in a Swedish Population

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Objective: Bacterial colonization of the stomach is possible with increasing gastric pH, occurring during PPI-treatment or with atrophic gastritis. PPI's are commonly used in Sweden. Gastric bacterial flora is believed to be of mainly oropharyngeal origin. Swallowed bacteria may colonize the stomach when local pH rises above 4. The aim of this study was to characterize and quantify gastric bacteria in individuals with and without continuous PPI-treatment and simultaneously measure gastric pH.

Method and Procedures: Clinical cross-sectional study. Patients referred for routine out-patient gastroscopy were included, omitting control gastroscopies. Exclusion criteria were; altered anatomy, on-demand PPI-intake, antibiotics during the last 3 months or finding of malignancy. Gastric juice was aspirated at start of the examination and gastric pH was measured. Samples for bacterial culturing were obtained from the gastric antrum by brushing the mucosa with a sterile ERCP-cytology-brush. Culture-based methods were used for identification and quantification of bacteria. Positive cultures were characterized as slight, $\geq$ 102 CFU/mL, or abundant, $\geq$ 104 CFU/mL. Included patients were divided into two groups, patients with or without continuous PPI-treatment.

Results: A total of 107 patients were included and eligible for analyses, 55 with and 52 without PPI-treatment. Overall median age was 57 y (19–88), 54% male. Indications for gastroscopy were abdominal pain (28%), nausea/reflux (51%) anemia/bleeding (10%) and miscellaneous (12%). Outcomes were 50% normal gastroscopies, esophagitis (15%) gastritis (12%) ulcer (6%). No bacterial colonization was found in 53% of all patients (n = 107), 31% (n = 33) showed slight bacterial growth and 16% (n = 17) abundant growth. Among patients without PPI, 41 individuals (79%) showed no bacterial growth, 8 (15%) slight growth and 3 (6%) abundant growth. Among patients with PPI-treatment, 16 (30%) showed no bacterial growth, 25 (45%) slight growth and 14 (25%) abundant growth. The distribution of bacterial growth differed significantly between the two groups, $p < 0{,}0001$. Dominating bacterial species were Streptococcus mitis, Streptococcus salivarius and Streptococcus sanguinis. Patients with PPI treatment showed significantly higher pH, median 6,9, than those without, median 1,6 ($p = 0{,}00{,}001$). Patients with positive cultures, both slight and abundant growth, had significantly higher gastric pH than those with negative cultures ($p < 0{,}0001$).

Conclusions: Gastric bacterial colonization, when found, consists of oropharyngeal flora. Local gastric pH seems to have a significant impact on the opportunity for swallowed bacteria to dwell and colonize in the stomach. Both the oropharyngeal flora and PPI-intake need to be considered for indications and choice of prophylactic antibiotics during gastric surgery or transgastric interventions.

P276

pH Evaluation of the Hiatal Hernia Measurement

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Background: Failure of the antireflux barrier can occur with progressive dilation and displacement of the esophageal hiatus. Methods of measurement include Hill grade, axial displacement and greatest transverse diameter. We use pH measurements to identify differences in hiatal measurement.

Methods: A registry of endoscopic measurements was analyzed for differences in pH. A total of 288 patients with measurements of Hill grade, axial displacement of gastroesophageal junction and greatest transverse diameter and pH Demeester score were reviewed. Anova evaluated statistical differences between each measurement.

Results: Hill grade 1, N = 40, had a mean DeMeester score of 8.95(0.3 to 67.6) sd 13.31. Hill grade 2, N = 17; 21.70(0.4 to 62.9) sd 16.64. Hill grade 3, N = 129; 37.03(0.3 to 133.5) sd 25.14. Hill grade 4, N = 102; 47.87(0.3 to 148.3) sd 30.88. Anova analysis demonstrated differences between Hill 1 and Hill 3 and Hill 4, Hill 2 and 4 measurements.

Axial displacement measurement of 0.0 displacement, N = 59, had a mean DeMeester score of 12.98(0.3 to 67.6) sd 12.98. 1.0 cm (cm) displacement, N = 39; 36.26(0.7 o 93.8) sd 25.06. 2.0 cm displacement, N = 79; 38.1(0.3 to 133.5) sd 27.05. 3.0 cm axial displacement, N = 46; 46.93(3.0 to 122.8) sd 46.93. 4.0 cm axial displacement, N = 27; 46.57(0.3 to 115.6) sd 29.43. An axial displacement > 5.0 cm, N = 38; 46.40(1.6 to 148.3) sd 31.84. Anova analysis demonstrated differences between 0.0 cm measurements and all other measurements, but no differences between any other levels of measurement.

Greatest transverse diameter measurements of < 1.5 cm, N = 40, had a mean DeMeester score of 9.03(0.3 to 67.6) sd 13.26. 2.0 cm, N = 7; 22.62 (0.3 to 62.9) sd 22.45. 3.0 cm, N = 15; 24.67(2.9 to 61) sd 24.67. 4.0 cm, N = 124; 37.64(0.3 to 133.5) sd 25.48, > 5.0 cm, N = 102; 47.34(0.3 to 148.3) sd 30.93. Anova analysis demonstrated differences between measurements of 1.0 and 3.0, 4.0, 5.0 and 3.0 to 1.0 and 5.0, and 4.0 to 1.0, and 5.0 to 1.0 and 3.0 cm.

Conclusions: Hill measurements may guide the decision for hiatal repair when Hill grade is > 3, axial displacement for any displacement of the gastroesophageal junction, and greatest transverse diameter if the measurement is > 3.0 cm. Further study of these measurement systems is needed to determine which measurement best guides the decision for hiatal repair.

P277

Complications of Iatrogenic Hiatal Hernias: A Case Study of Robotic Post-esophagectomy Hiatal Hernia Repairs

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Esophagectomy, regardless of indication or approach, inevitably requires enlargement of the diaphragmatic hiatus. For those who are able to survive the immediate postoperative course, this defect may produce iatrogenic Type IV hiatal hernias. These may be detected incidentally during routine follow-up or manifest as digestive, respiratory or cardiac symptoms acutely or chronically. While the literature supports repair of symptomatic post-esophagectomy hiatal hernias, the vast majority of minimally invasive cases have been performed laparoscopically with no consensus on cruroplasty or mesh graft reinforcement. We report a three-patient case study using the Intuitive DaVinci robot to repair post-esophagectomy hiatal hernias during the 2021 calendar year. Our patients all underwent an Ivor-Lewis esophagectomy. Indications were T1N1M0, T2N1M0 esophageal adenocarcinoma, and idiopathic achalasia refractory to Heller myotomy. They presented with symptoms ranging from persistent gastric reflux to acute thoracic small and large bowel obstructions. Two patients had hiatal hernias detected on outpatient CT scans ordered primary care providers as part of routine symptom workup. One patient presented with acute obstruction requiring semi-urgent repair. All repairs were conducted by a single surgical attending with reduction of hernia sac small and large intestine, left lateral cruroplasties, and mesh reinforcement. The mean hospitalization was 3 days and no postoperative complications were noted during admission. One patient represented to the emergency department with CT demonstrated omental infarction that was successfully resolved with outpatient analgesics. As early detection and multimodal therapy continue to improve detection and treatment of esophageal cancer, we anticipate that post-esophagectomy survival will continue to increase, portending to more post-esophagectomy hiatal hernias. We propose that robotic post-esophagectomy hiatal hernia repairs, accompanied by left lateral cruroplasty and mesh reinforcement, is a safe and feasible treatment modality for this growing patient population in the future.

P278

Use of the Soehendra Lithotriptor for Endoscopic Removal of Eroded Linx Magnetic Spincter Augmentation Devices: A Safe, Effecient, and Cost Effective Technique

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Introduction: The Linx magnetic sphincter augmentation device is increasingly utilized in the laparoscopic treatment of GERD and associated hiatal hernia repair. It has been documented to be effective and has a good overall safety profile. A rare, but serious complication is erosion of the device into the esophageal lumen. This generally occurs in between 0.4% and 0.5% of cases. Foregut surgeons should be familiar with this complication and its treatment. The preferred treatment is endoscopic division and removal of the device. The Sohendra Lithotriptor is a safe, efficient, and cost effective device for endoscopically dividing the ring of eroded magnetic beads for endoscopic removal.

Methods: A retrospective record review of the chart was made to review two cases with erosion of the Linx device into the esophageal lumen. We utilized the Soehendra lithotriptor device was utilized to break the Linx device ring, allowing for endoscopic removal of the devices.

Results:

Sex	Age	Time to Erosion	Linx Size	LOS	Complications.
F	75	6.5 years	13	1 day	None
M	73	7.6 years	14	0 day	None

Conclusions: The Soehendra lithotriptor device provides asafe, efficient, and cost effective use of the lithotripter device to divide and remove eroded Linx devices.

P280

Predictors of Morbidity, Readmission, and Reoperation After Laparoscopic Heller Myotomy

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Introduction: Morbidity, readmissions, and reoperations are uncommon after laparoscopic Heller myotomy (LHM). The impact of readmission/reoperation on morbidity for patients after LHM is unknown. The goal of this study was to examine the impact of these on morbidity and to identify predictors of readmission/reoperation and morbidity.

Methods: Patients undergoing LHM were identified from the National Surgical Quality Improvement Program (NSQIP) database over 8 years, ending in 2019. Age, sex, past medical history (diabetes, COPD, smoking, steroid use, recent weight loss), ASA class, pre-operative labs (sodium, BUN, creatinine, hematocrit), procedural details (OR time, specialty performing operation) morbidity (pneumonia, unplanned intubation, pulmonary embolism, acute kidney injury, urinary tract infection, stroke, MI, sepsis/septic shock, cardiac arrest, DVT, post-operative bleeding) and mortality were recorded. Multivariable logistic regression (MLR) analysis was performed to determine independent predictors of both readmission/reoperation and morbidity.

Results: 3780 patients were identified. The majority were female (51%) with a median age and BMI of 54 and 27, respectively. 167 (4.4%) patients required either readmission or reoperation. Patients requiring readmission/reoperation were similar in age, sex, and BMI, though had lower albumin (3.9 vs 4.1, $p = 0.005$), lower hematocrit (39 vs 41, $p = 0.005$), were more likely diabetic (16 vs 10%, $p = 0.019$), current smokers (21 vs 14%, $p = 0.019$), had COPD (8.4 vs 4%, $p = 0.004$), were currently on steroids (6.6 vs 3%, $p = 0.009$), and had experienced weight loss (16.8 vs 11.1%, $p = 0.025$) compared to those who did not require readmission/reoperation. LOS (3 vs 1 days, $p < 0.0001$), morbidity (28.1 vs 1.4%, $p < 0.0001$), and mortality (1.2 vs 0.1%, $p = 0.026$) were significantly increased in patients requiring readmission/reoperation. MLR identified lower HCT (OR 1.05, 95%CI 1.01–1.09, $p = 0.009$), longer OR times (OR 1.01, 95%CI 1.0–1.02, $p = 0.001$), and higher ASA (OR 1.66, 95%CI 1.23–2.23, $p = 0.001$) as predictors of readmission/reoperation and age (OR 1.03, 95%CI 1.02–1.05, $p < 0.0001$), longer OR times (OR 1.01, 95%CI 1.005–1.009, $p < 0.0001$), and COPD (OR 2.68, 95%CI 1.42–5.04, $p = 0.002$) as predictors of increased morbidity after LHM.

Conclusions: Patients requiring readmission/reoperation after LHM suffer prolonged hospital LOS, significant morbidity and mortality. Those with pre-existing conditions, weight loss, and steroid use should all be carefully observed given their increased incidence of readmission/reoperation. Increasing age, higher ASA, lower hematocrit, COPD, and longer OR times were all independently associated with readmission/reoperation and increased morbidity following LHM. Thus, limiting operative time emerges as the only potentially *modifiable* risk factor for reducing both readmission/reoperation and morbidity post-LHM.

P281

Can pre-operative comorbidities predict the development of atrial fibrillation after transhiatal esophagectomy?

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Introduction: Atrial fibrillation has a reported incidence after esophagectomy of approximately 12–37%. Although prior studies have studied the incidence of esophagectomy after leak, the risk factors to predict atrial fibrillation after transhiatal esophagectomy (THE) have not been established. We sought to identify if pre-operative comorbidities or method of surgery (open vs. laparoscopic vs robotic) had an impact on development of post-operative atrial fibrillation.

Methods and Procedures: A retrospective chart review of patients who underwent transhiatal esophagectomies at a single institution was performed between 2012–20. Pre-operative comorbidities were noted and a detailed chart review of perioperative course was conducted to identify the development of atrial fibrillation. Univariate analysis was then conducted between patients who developed atrial fibrillation after esophagectomy to those who did not.

Results: 130 patients who underwent transhiatal esophagectomy were identified between 2012–2020. 29 patients (22%) developed atrial fibrillation during their post-operative course. On univariate analysis, gender ($p = 0.293$) and comorbidities including hypertension ($p = 0.757$), diabetes ($p = 0.934$), hyperlipidemia ($p = 0.319$), CHF ($p = 0.287$), COPD ($p = 0.758$), hypothyroidism ($p = 0.855$), and asthma ($p = 0.734$) did not vary significantly between groups. Cardiac history including CAD ($p = 0.102$), history of MI ($p = 0.895$), and prior documentation of atrial fibrillation ($p = 0.944$) did not vary significant as well. Lastly method of surgery (open, laparoscopic, or robotic) did not differ significantly between the two groups ($p = 0.375$).

Conclusion: No prior study has examined the correlation of pre-operative comorbidities with the development of atrial fibrillation after transhiatal esophagectomy. Our results suggest that developement of AF after THE does not appear to depend on preoperative cardiac risk factors.

Characteristics of Patients (n = 130)			
	No A-Fib (n = 101)	A-fib present (n=29)	X^2
Variables			
Gender			
Female	13 (12.87%)	6 (20.69%)	p = 0.293
Male	88 (87.13%)	23 (79.31%)	
Age (mean)	62.6	68.8	
Hypertension			
Absent	38 (37.62%)	10 (34.48%)	p = 0.757
Present	63 (62.38%)	19 (65.52%)	
Diabetes			
Absent	67 (66.34%)	19 (65.52%)	p = 0.934
Present	34 (33.66%)	10 (34.48%)	
Hyperlipidemia			
Absent	63 (62.38%)	21 (72.41%)	p = 0.319
Present	38 (37.62%)	8 (27.59%)	
CHF			
Absent	96 (95.05%)	26 (89.66%)	p = 0.287
Present	5 (4.95%)	3 (10.35%)	
COPD			
Absent	81 (80.2%)	24 (82.76%)	p = 0.758
Present	20 (19.8%)	5 (17.24%)	
Asthma			
Absent	96 (95.05%)	28 (96.55%)	p = 0.734
Present	5 (4.95%)	1 (3.45%)	
CAD			
Absent	81 (80.2%)	27 (93.1%)	p = 0.102
Present	20 (19.8%)	2 (6.9%)	
History of MI			
Absent	98 (97.03%)	28 (96.55%)	p = 0.895
Present	3 (2.97%)	1 (3.45%)	
History A fib			
Absent	91 (90.1%)	26 (89.66%)	p = 0.944
Present	10 (9.9%)	3 (10.35%)	
Hypothyroidism			
Absent	93 (92.08%)	27 (93.1%)	p = 0.855
Present	8 (7.92%)	2 (6.9%)	
Surgery type			
Open	24 (23.76%)	8 (27.59%)	
Laparoscopic	18 (17.82%)	8 (27.59%)	p = 0.375
Robotic	59 (58.42%)	13 (44.83%)	

P282

Is There a Difference in pathologic Response to Neoadjuvant Therapy Based on Chemotherapy Regimen in Esophageal Cancer?

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Introduction: Neoadjuvant chemoradiotherapy has become the mainstay of treatment for locally advanced esophageal cancer. CALGB 9781 trial established cisplatin and 5-flourouracil with radiotherapy as superior to surgery alone while the CROSS trial established paclitaxel, carboplatin, and radiotherapy as superior to surgery alone. There has been no data looking at the degree pf pathologic response to these two treatment regimens. This study aims to look at this.

Methods and Procedures: A retrospective chart review at a single institution of patients who underwent esophagectomies between 2012–2020 and who received neoadjuvant chemoradiotherapy with either Cisplatin and 5-Flourouracil or Carboplatin and paclitaxel was performed. Demographics as well as clinical stage (c), pathologic stage (yp), and response rates with Modified Ryan Scores were collected. Univariate analysis between the two groups was performed with a p value of < 0.05 considered statistically significant.

Results: 82 patients were identified between 2012–2020 who underwent esophagectomy after neoadjuvant chemoradiotherapy. 74 (90.2%) received carboplatin and paclitaxel while 8 (9.8%) received 5-flourouracil and carboplatin. Both groups included patients with squamous cell carcinoma and adenocarcinoma. There was no significant difference in clinical stage prior to surgery ($p = 0.145$), type of surgery performed (open, laparoscopic, or robotic) ($p = 0.484$), and pathologic stage after resection ($p = 0.433$) between the two groups. Modified Ryan score between the two groups also showed no significant difference ($p = 0.745$).

Conclusion: This is the firsty study to compare the pathologic response by Ryan Score to different regimens of chemoradiotherapy. The data presented would suggest that both regimens are equivalent and this supports clinical data suggesting similar long term results.

Characteristics of patients undergoing NAT for esophageal cancer			
Variables	Carboplatin and Paclitaxel (n = 74)	Cisplatin & 5-FU (n= 8)	
Age (years, range, mean)	42-85 (63)	57-87 (69)	
Gender			
Female	6 (8.1%)	1 (14.2%)	
Male	68 (91.8%)	7 (87.5%)	
Tumor type			
Adenocarcinoma	67 (90.5%)	4 (50%)	
SCC	7 (9.5%)	4 (50%)	
Clinical Stage			
II	10 (13.5%)	3 (37.5%)	
III	61 (82.4%)	5 (62.5%)	X^2, p = 0.145
IVA	2 (2.7%)	0 (0.0%)	
X	1 (1.3%)	0 (0.0%)	
Chemotherapy Duration (weeks) Mean, std dev.	5.7 (2.3)	5.7 (0.4)	
Radiation Duration (weeks) Mean, std dev	6 (2.5)	5.5 (0.9)	
Type of surgery			
Open	17 (23%)	3 (37.5%)	
Laparoscopic	13 (17.6%)	2 (25%)	X^2, p = 0.484
Robotic	44 (59.4%)	3 (37.5%)	
Margin status			
R0	63 (85.1%)	7 (87.5%)	X^2, p = 0.857
R1	11 (14.9%)	1 (12.5%)	
Pathological stage (yp)			
I	28 (37.8%)	5 (62.5%)	
II	11 (14.9%)	2 (25%)	
IIIA	7 (9.5%)	0 (0.0%)	X^2, p = 0.433
IIIB	19 (25.7%)	1 (12.5%)	
IVA	9 (12.2%)	0 (0.0%)	
Modified Ryan Score			
0	12 (16.2%)	2 (25%)	
1	22 (29.7%)	2 (25%)	
2	29 (39.2%)	2 (25%)_	X^2, p = 0.745
3	11 (14.9%)	2 (25%)	

P283

Is it Worthwhile to Use 68-Gallium DOTATATE PET/CT in the Workup of Gastroduodenal NETs?

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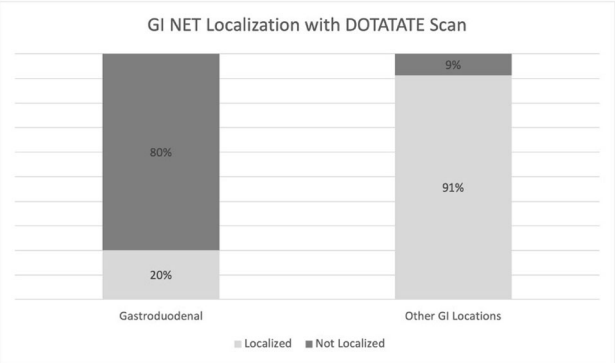
Introduction: Gastrointestinal neuroendocrine tumors (NETs) represent a heterogenous group of tumors arising from various organs within the GI tract that comprise approximately 55% of all NETs. 68Gallium (68 Ga) DOTATATE PET/CT (GDP) is considered a valuable tool in the workup for NETs with reported sensitivities ranging between 80–100%. Little is known about the sensitivity of this scan in relation to primary tumor location.

Methods and Procedures: A retrospective chart review of patients with pathologically confirmed primary NETs arising from the stomach and duodenum were compared with NETs arising from the small bowel and pancreas and who underwent a 68 Ga dotatate PET/CT.

Results: 10 patients with primary NETs arising from the stomach (40%) and duodenum (60%) were identified and compared to 23 patients with primary NETs arising from the pancreas (56.5%), ileum (34.8%), jejnum (4.3%), and colon (4.3%). There was no significant difference between both groups regarding gender and comorbidities (hypertension, hyperlipidemia, diabetes, and tobacco use). Tumor grades in both groups were Grade 1 and 2 only. 2 out of 10 total patients (20%) in the gastroduodenal group had avidity corresponding to their primary tumor compared to 21 out of 23 patients (91.3%) in the PNET group ($p < 0.001$).

Conclusion: This is the first study examining the sensitivity of 68Gallium DOTATATE PET/CT in the evaluation of primary NETs of the GI tract, This limited data set suggests that GDP is of limited utility for tumors of the stomach and duodenum, but is very helpful in NET of other gastrointestinal locations. This has implications for the indication for GDP in patients with NETs.



P284

Factors Associated with the "Unfun" Fundoplication

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Fundoplication for gastroesophageal reflux disease (GERD) is generally described as having a 90% patient satisfaction. The 10% not-so-satisfied population is substantial and understudied. Factors associated with poor satisfaction include obesity, anxiety/depression, extraesophageal symptoms, and poor response to medical treatment. We describe a 4-year experience with patients referred to a tertiary care foregut practice experiencing digestive symptoms after fundoplication.

Between 2017 and 2021 thirty-four patients were prospectively accumulated in an "unfun" fundoplication database. 70.6% were female. Average age at index fundoplication was 54 years. Average age at our consult was 62 years (range 36–85). Average BMI was 27.6; one third of patients were obese (BMI > 30.0). There was an average of 8.5 years between index operation and consultation to our facility. Patients with anxiety/depression (38.2%) were referred within an average of 4.3 years. 20.6% had a diagnosis of achalasia or pseudo-achalasia from wrap obstruction. The most common chief complaints were dysphagia (61.8%) and nausea/vomiting (23.5%). Chest pain (11.8%), cough (5.9%) was rare. Workup included barium swallow (64.7%), manometry (47.1%), upper endoscopy (44.1%), and 24-h pH monitor (11.8%). Twenty-three patients went on to require re-operation (67.6%), with 91.3% requiring fundoplication takedown. There were five myotomies.

Fundoplication failure is an understudied and underappreciated phenomenon. The most common reason for reoperation in our database was esophageal outflow impedance, either from achalasia at the time of the index operation or an outflow issue developing after fundoplication. It is unclear if fundoplication caused esophageal outflow issues, further work is needed. A full esophageal motility work up is mandatory in all initial decisions for anti-reflux surgery. Fundoplication may have a long-term detrimental effect on esophageal outflow in some patients. Patients with dysphagia should be given extra pause in recommending fundoplication. A frank discussion of failure should be part of pre-surgery counseling.

P285

Lower Rates of Unplanned Conversion to Open in Robotic Approach to Esophagectomy for Cancer

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Introduction: Minimally invasive surgery (MIS) approaches to esophagectomy have been increasingly adopted worldwide; however, unplanned conversion from MIS to an open approach is not uncommon. This study sought to investigate risk factors associated with converting to an open approach and to evaluate outcomes following conversion.

Methods: We queried patients undergoing minimally invasive esophagectomy for cancer from 2016–2019 using the Procedure Targeted National Surgical Quality Improvement Program Database. Patient demographics, disease-related information, perioperative data, and short-term outcomes were reviewed. Multivariable, stepwise logistic regression analysis was performed to investigate factors associated with unplanned conversion to open esophagectomy.

Results: A total of 1,347 patients with a median age of 65 years underwent minimally invasive esophagectomy for cancer. The cohort was comprised of 17% females, 92% Caucasians, and a median patient BMI of 27. Adenocarcinoma was the predominant pathology (87%). A laparoscopic approach was most common (51%), while 18% underwent a robotic approach. A total of 140 patients (10%) underwent conversion to open. Patients who were converted to open experienced higher leak (19% vs 15%, $P = 0.01$) and reoperation rates (21% vs 14%, $P = 0.02$) as well as increased morbidity (54% vs 33%, $P < 0.01$) and mortality (5% vs 2%, $P = 0.02$). Univariate analysis revealed several factors associated with higher chance of conversion including morbid obesity, diabetes, hypertension, ASA class, and squamous cell carcinoma. A robotic approach was associated with a lower likelihood of conversion to open (OR 0.57, 95% CI 0.32–0.99). On multivariable analysis, squamous cell carcinoma pathology was the only independent variable associated with increased conversions to open (OR 2.66, 95% CI 1.02–6.98).

Conclusions: In this study, a robotic approach to esophagectomy was associated with a lower likelihood of unplanned conversion to open, and patients who were converted to open experienced worse outcomes. Future studies should be explored to determine why a robotic approach to esophagectomy may lead to fewer open conversions, as it may be an underappreciated benefit of this newest operative approach.

P286

Giant Hiatal Hernia Recurrence—Laparoscopic Repair with the Use of a Collagen Graft

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Recurrence of large hiatal hernia is associated with gastroesophageal reflux disease (GERD), dysphagia and "mechanical" complications such as obstructions in 50–90% of cases. Several trials strongly support surgery as an effective alternative to medical therapy. Today, laparoscopic or robotics fundoplication is considered as the procedure of choice.

However, performing primary hiatal hernia repair is associated with upto 42% recurrence rate. Mesh reinforcement of the crural closure decreases the recurrence but can lead to complications, requiring a meticulous technique. We experiment an absorbable collagen graft.

We present a case of a 67-year-old female patient, who underwent a laparoscopic procedure for a large hiatal hernia and GERD two years ago. After this procedure she presented a pneumonia and developed a recurrence of the hernia. Endoscopy, Thorax CT and contrast X-Ray studies revealed a large hiatal hernia and esophagitis. With laparoscopic approach, the hiatal hernia defect was identified and primarily repaired, by crural closure. The collagen graft was trimmed to fit the defect accommodating the esophagus.

The collagen graft was easily placed laparoscopically. It has good handling and could be cut and tailored intraoperatively for optimal adaptation. There were no short-term complications.

Conclusion. Crural closure reinforcement can be done readily with this new totally absorbable mesh replaced by soft tissue over six months.

P287

Risk Factors for Adverse Outcomes Following Paraesophageal Hernia Repair Among the Obese Population

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Introduction: Obesity is an established risk factor for adverse outcomes after paraesophageal hernia repair (PEHR). As a consequence of the obesity pandemic, many obese patients will nonetheless receive PEHR. The purpose of this study was to explore risk factors for adverse outcomes of PEHR among this high-risk cohort. We hypothesized that obese patients may have other risk factors for adverse outcomes following PEHR.

Methods: A retrospective study of a high-volume, academic medical center was performed of consecutive, adult obese patients who underwent laparoscopic PEHR from 2017–2019. Patients were excluded for BMI < 30 or if they had concomitant bariatric surgery at time of PEHR. The primary outcome of interest was a composite adverse outcome (CAO) defined as having any of the four following outcomes after PEHR: persistent GERD $>$ 30d, persistent dysphagia $>$ 30d, evidence of recurrence on imaging, or reoperation. Chi-square and t-test analysis was used to compare demographic and clinical characteristics to determine their association with CAO. Multivariable logistic regression analysis was used to evaluate independent predictors of CAO.

Results: 139 patients met inclusion criteria with a median follow-up of 19.7 months (IQR 8.8–81.0). 51 of 139 patients (36.7%) had a post-operative CAO: 31/139 (22.4%) had persistent GERD, 20/139 (14.4%) had persistent dysphagia, 24/139 (17.3%) had recurrence, and 6/139 (4.3%) required reoperation. On bivariate analysis, patients with a CAO were more likely to have a history of prior abdominal surgery (86.3% vs 70.5%, $p = 0.04$) and were less likely to have undergone a preoperative CT scan (27.5% vs 45.5%, $p = 0.04$). A multivariable analysis showed an independent association between previous abdominal surgery and an increased likelihood of CAO whereas age and preoperative CT scan were associated with a decreased likelihood of CAO (Table).

Conclusions: Although rate of adverse outcomes was high among obese patients, laparoscopic PEHR may be appropriate in a subset of obese patients at specialized centers. Patients with a prior history of abdominal surgery and those without a preoperative CT scan were more likely to have a CAO. These findings may help guide the appropriate selection of obese patients for PEHR.

Odds Ratio Estimates

Factor		Odds Ratio	95% Confidence Limits	
Age:		0.970	0.944	0.997
Body Mass Index:		0.975	0.895	1.062
Preoperative CT Scan:	Yes vs No	0.429	0.198	7.208
Previous Abdominal Surgery:	Yes vs No	2.749	1.048	3.308

P288

Discontinuance of PPI's in Patients with Barrett's Esophagus Following cTIF

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Background: The treatment of gastroesophageal reflux disease has evolved during the era of minimally invasive surgery. Concomitant transoral incisionless fundoplication(cTIF) which incorporates laparoscopic hiatal hernia repair with TIF can be done safely in an outpatient setting with excellent patient satisfaction and minimal side effects in patients. The ability of cTIF to restore anatomy to its natural state while creating a gastroesophageal flap valve may confer some benefit to patients with Barrett's esophagus.

Methods: A retrospective review was conducted of 13 cTIF procedures performed by a single surgeon between October 2019 and October 2020, all of whom had at least 6 months of postoperative followup. 13 patients were reviewed who were diagnosed with intestinal metaplasia without dysplasia preoperatively. 6 of the patients also had follow up endoscopy post cTIF.

Results: 12 out of 13 patients were no longer taking PPI medication and were still pleased with the continued symptom relief. 6 patients underwent endoscopy post cTIF which revealed intestinal metaplasia without dysplasia in 3 patients and reflux esophagitis in 3 patients.

Conclusions: cTIF can provide relief of symptoms and freedom from the continued use of PPI's in short term followup. Further study is necessary to determine if the benefits are comparable to GERD patients without Barrett's esophagus.

P290

How does Robot Assistance Affect Outcomes? A Retrospective Review of Laparoscopic and Robotic Heller Myotomy and Nissen Fundoplication

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Background: Laparoscopic Heller myotomy is standard treatment for achalasia while laparoscopic Nissen fundoplication is standard treatment for gastroesophageal reflux disease and hiatal hernia. Robotic assistance, compared to standard laparoscopic approach, may potentially grant surgeons advantages such as enhanced visualization and dexterity. This study compares patient outcomes for Heller myotomy (HM) and Nissen fundoplication (NF) when performed laparoscopically versus robotically.

Methods: A retrospective review of patients at a single institution who underwent laparoscopic or robotically assisted HM or NF from January 2019 to June 2021 was conducted. We identified 95 HM (72 laparoscopic, 23 robot-assisted) and 86 NF (62 laparoscopic, 24 robot-assisted) performed by 3 surgeons. Patient outcomes investigated were operative time, hospital length of stay, postoperative imaging, resolution of symptoms at 30 days, resolution of symptoms at 90 days, and complications (conversion to open, intraoperative leak, postoperative intervention, postoperative leak, 30-day intensive care unit admission, reoperation, readmission, pneumonia, unplanned intubation, urinary tract infection, sepsis, superficial surgical site infection, deep SSI).

Results: In the HM cohorts, average operative time was longer in the robotic cohort for HM (128 min robotic vs 108 min laparoscopic, $p < 0.01$). However, overall complication rates were lower in the robotic group ($p < 0.05$) and hospital length of stay was also shorter in the robotic group (1.3 days compared to 2.7 days, $p < 0.001$). In the NF cohorts, there was no significant difference in operative time. However, hospital length of stay was shorter in the robotic group (2 days compared to 2.8 days, $p < 0.01$) but otherwise outcomes were similar. There was no difference in rate of post-operative resolution of symptoms or need for additional interventions for both HM and NF.

Conclusion: Robotic assisted HM and NF are associated with shorter hospital stays compared to their respective laparoscopic approaches. Robotic assisted HM also has a lower rate of complications. Our findings suggest that there may be a benefit to robotic assistance for shortening hospital length of stay and decreased complications for certain surgeries.

P291

Heller Myotomy has a Higher Likelihood of Post-operative Intervention than Poem

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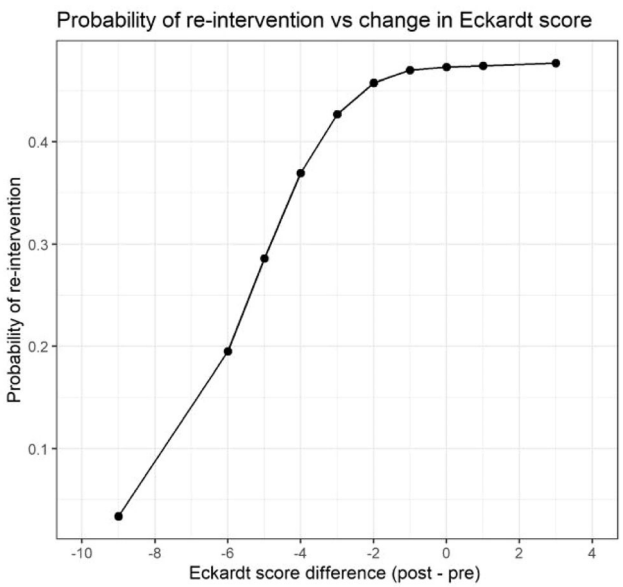
Introduction: Common esophageal motility disorders include achalasia, jackhammer esophagus, and esophagogastric junction outflow obstruction. Two surgical procedures used to treat these disorders are laparoscopic Heller myotomy (LHM) with partial fundoplication and per-oral endoscopic myotomy (POEM). The difference in frequency of follow up interventions between the two procedures is unknown. This study was designed to report differences in post-surgical interventions as one of the major discussion points with the patient.

Methods: An IRB approved registry was used to identify all patients undergoing surgery with LHM or POEM for an esophageal motility disorder. All motility disorders were diagnosed by high resolution manometry. The type of intervention was recorded, LHM or POEM, as well as post-operative follow-up interval of at least six months. The following post-operative interventions were identified: esophageal non-pneumatic dilation, botox injection, repeat myotomy, or addition of a fundoplication. Multivariable logistic regression analysis was performed to estimate adjusted risk factors associated with return for additional post-operative intervention.

Results: A total of 200 patients were identified, 137 met inclusion criteria. Patients were separated by procedure, a total of 33 LHM and 104 POEM. There was a difference between the two groups with regard to pre-operative Eckardt score (LHM 6.0 vs POEM 7.5, $p = 0.02$). Patients undergoing LHM resulted in a higher rate of post-operative intervention than POEM (45% vs 18%, $p < 0.01$). With regard to the interventions, there was a higher rate of non-pneumatic EGD dilation in LHM (33% vs 15%, $p = 0.04$), as well as a higher rate of repeat myotomy (18% vs 2%, $p < 0.01$). There was no difference in the proportion of patients receiving botox injection (LHM 9% vs POEM 4%, $p = 0.36$). We also found there was no difference in time to post-operative intervention for either group, but if intervention were to occur the median time was within the first year. Patients with a change in their pre- to post-operative Eckardt score of 4 or greater decreased their chance of having a post-operative intervention (Fig. 1).

Conclusion: Our results for both LHM and POEM emphasizes the importance of long-term follow up in patients with an esophageal motility disorder. We have found that patients undergoing LHM are more likely to have a post-operative intervention as well as a higher rate of repeat myotomy than POEM. With both interventions, a greater change in Eckardt score decreased the likelihood of reintervention.



P292

Management of Acquired Tracheoesophageal Fistula with Sternohyoid Muscle Flap Interposition Using Lateral Approach

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Introduction: Acquired fistula between the airway and esophagus is a rare but challenging clinical problem. Regardless of the etiology, the life-threatening aspects of this condition are mostly due to the ongoing tracheobronchial contamination, with resulting pulmonary sepsis and interference with nutrition. Operative closure of TEF is mandatory, because spontaneous closure is exceptional and must not reasonably be expected. Based on the location, condition of trachea & esophagus various approaches has been described. In this case report, we would like to describe operative technique of fistula repair with sternohyoid muscle inteposition flap.

Case History: 32 years old female had consumed organophosphorus poison an year ago following which she was resuscitated and was on ventilator support in view of respiratory failure. Following recovery from the illness she developed repeated chest infections along with cough while ingestion of food and significant weight loss. On evaluation, cross sectional imaging and upper GI endoscopy showed fistulous communication of $\sim$ 2.4 cm between trachea and esophagus at T2 level. After optimizing general condition, she underwent tracheoesophageal fistula repair using left sternohyoid muscle interposition flap using left cervical lateral approach with feeding jejunostomy. Post operatively upper GI contrast study on day 7 showed no leak, following which she was started on oral diet.

Conclusion: Surgical management of acquired benign TEFs is complex. The procedure of choice, whenever possible, consists in a single stage repair of both tracheal and esophageal defects and interposition of a tissue flap to separate the suture lines. Lateral approach with sternohyoid muscle interposition flap is a relatively simple and effective technique.

P294

Per Oral Cricopharyngotomy for Cricopharyngeal Bar: Emphasis on Technical Limitations

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Introduction: Endoscopic cricopharyngotomy (c-POEM) is a treatment for cricopharyngeal dysfunction, specifically cricopharyngeal bars. C-POEM differs from other endoscopic surgical procedures such as POEM, G-POEM, and Z-POEM. We report three patients who underwent c-POEM for cricopharyngeal bar, their clinical course, and outcomes.

Methods: Single institution retrospective chart review of three patients who underwent c-POEM and their immediate post-operative complications. These three patients represent the only patients who underwent c-POEM. The operating surgeons are experienced endoscopists who regularly perform endoscopic myotomy as part of their practice.

Results: The three patients were female, over 50 years old, and presented with dysphagia and cricopharyngeal bars. All three patients had perioperative complications, esophageal leak, requiring prolonged hospital courses and recovery. All three patients had persistent dysphagia up to 7 months following the procedure.

Conclusion: The results of this small case series exemplify the high rate of complications, specifically post-operative esophageal leak. Until there is improvement in instrumentation or surgical method we recommend against performing c-POEM as there is a high risk of esophageal leak and resultant complications.

P295

Intraoperative Use of Endoflip During Per-Oral Endoscopic Myotomy Reduces Incidence of Inadvertent Pneumoperitoneum

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Introduction: Per-oral endoscopic myotomy (POEM) has become an accepted minimally invasive alternative to Heller myotomy for the treatment of achalasia. One of the known adverse events associated with POEM is the inadvertent creation of pneumoperitoneum, often requiring Veress needle decompression. It has been postulated that this occurs when the submucosal tunnel is extended below the esophageal hiatus and onto the gastric wall. We hypothesized that the use of Endoscopic Functional Lumenal Imaging Probe (EndoFLIP) more accurately identifies the gastroesophageal junction, and thus should lower the incidence of inadvertent pneumoperitoneum.

Methods: This is a retrospective review of consecutive POEM cases performed at Baystate Medical Center, a tertiary referral academic medical center. Our data was kept in an IRB-approved REDCap database. EndoFLIP was utilized starting with the 66th case and has been used on all cases since. Pearson's Chi-Square test was used to test for statistical significance.

Results: 126 POEM cases were identified from June 10, 2011 – July 19, 2021. Of the 65 cases without EndoFLIP, inadvertent pneumoperitoneum occurred in 20 (30.8%) patients. Since the introduction of EndoFLIP, inadvertent pneumoperitoneum occurred in 6 (9.8%) patients ($p = 0.004$). Interestingly, we did not have a single case of inadvertent pneumoperitoneum in the most recent 42 cases.

Conclusions: Although the learning curve of POEM could contribute to the lessening incidence of inadvertent pneumoperitoneum, the use of EndoFLIP allows for more accurate identification of the anatomic location of the gastroesophageal junction. This enables the surgeons to tailor the myotomy to the most directed area. Prior to EndoFLIP, many surgeons relied on anatomic measurements using the endoscope; this can be notoriously unreliable if the scope bows in the submucosal tunnel. Having a better understanding of the post-myotomy EndoFLIP data can allow for cessation of the myotomy before entering the peritoneal cavity, which may decrease the incidence of this adverse event. In light of this data, it seems prudent to include the routine use of EndoFLIP during the performance of POEM.

P296

The Likelihood Patients Choose Laparoscopic Anti-reflux Surgery

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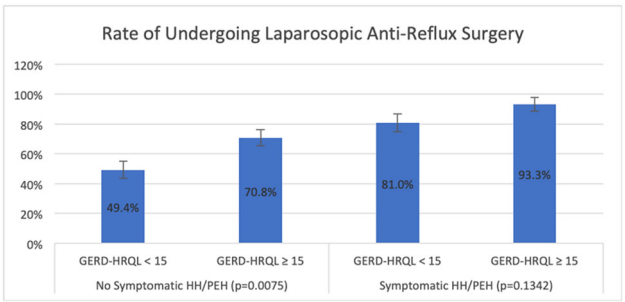
Introduction: Laparoscopic anti-reflux surgery (LARS) is the surgical management for medical refractory gastroesophageal reflux disease (GERD). However, the emergence of life-threatening risks from years of acid reduction therapy may drive patients to favor surgical management. We hypothesize that worse patient quality of life scores increase the likelihood of undergoing LARS.

Methods and Procedures: A review of a prospectively maintained quality database was performed. Patients who underwent surgical evaluation for GERD from January 2018 and April 2021 were included. Patient demographics, diagnostic work-up, and patient-reported outcomes were collected. The primary endpoint was surgical intervention. Group comparisons were made using two-tailed chi-square tests. Univariable and multivariable logistic regression analysis with 95% confidence intervals were used to evaluate the association between preoperative factors and LARS, with a statistical significance of $p < 0.05$.

Results: Three hundred and ninety-two patients underwent surgical evaluation for GERD. Two hundred and fifty-two patients (64.3%) decided to undergo LARS. Univariable analysis identified multiple factors with increased odds of having LARS. Symptomatic hiatal/paraesophageal hernia (OR = 4.00, 95% CI 1.92–8.36, $p < 0.001$), hernia on esophagram (OR = 2.06, 0.93–4.56, $p < 0.001$), abnormal acid test (OR = 16.30, 3.43–77.38, $p < 0.001$), esophagitis on endoscopy (OR = 2.10, 1.04–4.24, $p = 0.03$), completed manometry (OR = 7.21, 3.78–13.73, $p < 0.001$), preoperative GERD-HRQL score ≥ 15 (OR 2.22, 1.23–4.01, $p = 0.008$), scoring ≥ 3 on individual questions in the GERD-HRQL (OR = 2.62, 1.47- 4.70, $p = 0.001$), and self-reported dissatisfaction with their condition (OR = 3.48 1.90–6.38, $p < 0.001$), were most strongly associated with undergoing LARS. On multivariable analysis, the predictors of LARS are; symptomatic hiatal/paraesophageal hernia (OR = 11.22, 6.07–20.75, $p < 0.001$), completed work-up (OR = 2.32, 1.23–4.38, $p = 0.009$), abnormal acid test (OR 2.22, 1.22–4.05, $p = 0.009$), and preoperative GERD-HRQL Score ≥ 15 (OR = 2.44, 1.27–4.72, $p = 0.008$). A preoperative GERD-HRQL Score ≥ 15 was associated with a larger difference in the rate of surgery for those without symptomatic hiatal hernia (70.8% vs. 49.4%, $p = 0.008$) than for those with symptomatic hiatal hernia because most undergo surgery regardless of GERD symptoms (93.3% vs. 81.0% $p = 0.134$) (Fig. 1).

Conclusions: Patients who have a complete esophageal work-up, worse preoperative GERD-HRQL, symptomatic hiatal/paraesophageal hernia, and abnormal acid test are greater than two times more likely to choose LARS to manage GERD. These factors highlight important discussion points during surgical evaluation for GERD.

Fig. 1 HH/PEH (hiatal hernia/paraesophageal hernia)



HH/PEH (hiatal hernia/paraesophageal hernia)

P297

Massive Paraesophageal Hernia Repair in the Obese Patient Population; Fundoplication vs. Anti-reflux Gastric Bypass

Joseph Wasselle, MD; Ahan Kayastha; Adam Wilenski, MD; Joseph Sujka, MD; Rahul Mhaskar, MPH, PhD; Vic Velanovich, MD; Christopher DuCoin, MD; University of South Florida

Introduction: Obesity is a risk factor for gastroesophageal reflux disease (GERD) and hiatal hernia (HH). Regardless of obesity, HH is directly linked to GERD. Historically, fundoplication is the operation of choice for GERD with HH. Roux-en-Y gastric bypass (RNYGB) is the procedure of choice in GERD patients with a HH and obesity but is not an approved standalone treatment. We propose a new operation, Anti-Reflux Gastric Bypass (ARGB), utilizing a short efferent limb for GERD treatment. We hypothesized ARGB would lower HH recurrence rates, increase resolution of GERD, and improve weightloss compared to fundoplication.

Methods and Procedures: Retrospective study performed from 1/2013 – 2/2021 evaluating patients undergoing repair of large HH (> 5 cm) with obesity (BMI > 30). Primary outcome was hernia recurrence, secondary outcomes include symptom resolution and weight loss. Analysis utilized multivariate logistic regression adjusted for age, BMI, and hernia size; by nonlinear mixed modeling.

Results: Forty two patients underwent fundoplication, 16 patients underwent ARGB. Patients were predominantly female (fundoplication: 88.1%, ARGB: 87.5%). Fundoplication patients were older (64 vs. 50) with larger mean hernia size (8.5 × 6.3 cm vs. 6.6 × 6.3 cm), ARGB patients had a higher BMI (34.42 vs. 39.55). Recurrence showed nonsignificant lower incidence with ARGB and no difference in symptom resolution (Table 1). Weight loss was superior with ARGB (p = 0.0002).

Conclusions: Obese patients with large HH and GERD treated with ARGB trended toward a lower HH recurrence rate, similar GERD resolution, and improved weight loss. Symptomatic resolution was similar between groups with all outcomes trending toward superiority with ARBG. (Table 1).

Table 1 .

	Fundoplication	ARGB	P-Value
Recurrence	14.3%	0.0%	0.173
Heartburn resolution	84.0%	93.3%	0.388
Regurgitation resolution	83.3%	100.0%	0.471
Dysphagia resolution	78.3%	100.0%	0.401
Cough resolution	60.0%	100.0%	0.549
Dyspnea resolution	81.3%	100.0%	0.716
Chest pain resolution	61.9%	100.0%	0.072
Nausea resolution	55.0%	60.0%	0.894

P298

Suture Retraction of the Liver in Foregut and Bariatric Surgery: A Safe, Efficient, and Cost-Effective Technique

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Introduction: Laparoscopic foregut and bariatric surgical procedures frequently require liver retraction, but many mechanical retractors require additional trocars, equipment, and come with the risk of increased morbidity. One technique that can be an alternative for retracting the left lobe of the liver is utilizing a double sling suture to the diaphragm through a small subxiphoid incision. Here we describe our technique and experience utilizing this method in various laparoscopic foregut and bariatric surgical procedures.

Methods and Procedures: A retrospective chart review was performed on all patients who underwent laparoscopic sleeve gastrectomy, gastric bypass, LINX placement, and hiatal hernia repair with fundoplication from June 2014 to August 2021. Two different MIS surgeons performed the procedures (PR, LM). A 0-Vicryl suture is passed through the diaphragm and the two ends are externalized to the left and right side of the falciform ligament in a double sling fashion and brought out through a single, 2 mm, subxiphoid incision. Traction on both ends of the sling elevates the left lobe of the liver and exposes the operative field. We now report on its feasibility and incidence of complications – including liver injury, and need for conversion to conventional mechanical retractors.

Results: Eight hundred and one patients were included in the study. Indications for surgery in our cohort included morbid obesity (24.5%), GERD (47.4%), hiatal hernia (27.3%), Barrett's esophagus (0.4%) and median arcuate ligament syndrome (0.4%). There were 535 females and 266 males. The mean ages and BMI were 53.8 years/35.6 kg m2 for females, 54.7 years/31.8 kg m2 for males, and 54.3 years/33.7 kg m2 for the entire cohort. There were no liver injuries. Suture retraction was successfully utilized in 793 out of 801 cases. (99%) In the remaining 8 cases (1%), a mechanical liver retractor needed to be used.

Conclusion: The double sling suture method is a safe, efficient, and cost-effective alternative to conventional mechanical liver retraction techniques. Proficiency with suturing by some methodology (laparoscopic freehand, Endostitch, robotic-assisted) is required.

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Persistent Troublesome Bloating Impairs Disease Specific Quality of Life Following Laparoscopic Nissen Fundoplication

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Background: Laparoscopic Nissen fundoplication (LNF) remains the gold standard surgical treatment for gastroesophageal reflux disease (GERD) due to excellent control of reflux symptoms. Bloating is a common post-operative problem in the first year following fundoplication, but data regarding long-term issues are lacking. This study sought to examine the prevalence of persistent troublesome bloating symptoms and their impact on patient quality of life following LNF. We hypothesized that troublesome bloating is associated with impaired disease specific quality of life scores following LNF.

Methods: We analyzed a retrospective cohort who underwent LNF for GERD between 2009–2014 (n = 176). Long-term follow-up (LTFU) with a median interval of 72 (64–89) months was available for 93 (52.8%) patients who were included in the study. Patients were stratified into two groups based on the presence (n = 63) or absence (n = 30) of troublesome bloating symptoms at LTFU. Baseline demographics, objective testing, GERD-HRQL scores, and follow-up data, were prospectively collected by telephone interview. The primary outcome was LTFU GERD-HRQL score, while protein-pump inhibitor (PPI) use, reoperation and procedural satisfaction were secondary outcomes. Within and between-group comparisons were performed using Chi-square, Fisher's exact, Kruskal Wallis, Wilcoxon signed-rank, and Mann Whitney tests as appropriate. Data are presented as median (IQR), and $p < 0.05$ was considered significant regarding index surgery. Intervention included dilations or re-operations. P value of > 0.5 was considered significant.

Results: The groups did not differ in baseline demographics, DeMeester score, or baseline GERD-HRQL score. GERD-HRQL scores improved significantly in both groups from baseline to LTFU ($p < 0.01$). However, patients with troublesome bloating reported GERD-HRQL scores at LTFU of 9 (4–20) compared to 1.5 (0–8) in those without bloating ($p < 0.01$). Those with bloating achieved a long-term PPI cessation rate of 58% compared to 74% in those without bloating ($p = 0.11$), and there was no difference in reoperation rate (8% versus 3% respectively, $p = 0.37$). Eighty-two percent (n = 49) of patients with troublesome bloating expressed satisfaction with the procedure compared to 89% (n = 25) without bloating ($p = 0.28$), and 78% (n = 46) would have the procedure again given the benefit of hindsight compared to 86% (n = 24, $p = 0.29$).

Conclusion: Laparoscopic Nissen fundoplication produces durable improvements in disease-specific quality of life for patients with GERD, however it is associated with some degree of troublesome long-term bloating symptoms in a significant proportion of patients. Further, these symptoms are associated with decreased quality of life score when they occur, and this potential should be carefully considered when counseling GERD patients preoperatively.

P300

Large Paraesophageal Hernia Repair Durability is Improved with Biosynthetic Mesh in Mid-term Follow-Up

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Introduction: Mesh augmentation of the hiatus with primary cruroplasty during paraesophageal hernia repair (PEHR) improves short term recurrence, but long-term data is lacking. Biosynthetic mesh offers improved tissue incorporation compared to biologic mesh and lacks the mesh-specific complications of permanent mesh. Resorption profiles vary widely however, and the ideal composition remains unclear. Additionally, long term outcomes for biosynthetic mesh use at the esophageal hiatus are lacking. We sought to compare the mid-term efficacy of routine mesh reinforced PEHR in large (> 5 cm) paraesophageal hernias. Implanted mesh was either rapid absorbing (Gore-BioA®, 6 months) or delayed absorbing (Phasix-ST®, 18 months).

Methods: Retrospective review of a prospectively maintained database identified 140 patients (BMI 28, average age 62 years, 34% Male) that underwent elective laparoscopic mesh reinforced PEHR for large PEH from April 2018 to Jan 2021. Preoperative workup included esophagram, endoscopy, manometry, and pH studies. Postoperative complaints of reflux and dysphagia were investigated with endoscopy and esophagram to determine hernia recurrence or need for further intervention.

Results: Mesh, either BioA® (n = 85) or Phasix-ST® (n = 55), was placed anteriorly in a upside down U-shape and secured with Tisseel® following posterior cruroplasty with permanent suture. At a median follow-up of 30 months, overall subjective hernia recurrence was 20% and dysphagia requiring endoscopic dilation was 12%. There was no significant difference in average age, BMI or gender between the two groups. Hernia recurrence occurred more often with BioA than Phasix, but the difference was not significant (23% vs 14.5%, $p = 0.18$). Rates of dysphagia requiring endoscopic dilation also did not differ significantly between the two groups (8% vs 18%, $p = 0.1$). No mesh related complications occurred in either group.

Conclusion: Absorbable synthetic mesh provides improved midterm PEHR durability compared to historic rates of primary cruroplasty alone, especially in large paraesophageal hernias. Absorption profile does not significantly affect the rates of subjective recurrence or endoscopic dilation for dysphagia at 2.5 year follow-up. Further longitudinal study is needed to investigate the long-term durability of the repair, but short and midterm outcomes support the routine use of mesh-reinforcement in large PEHR.

P304

Laparoscopic & Endoscopic Management of Liver Cyst W/ Biliary Fistula in Patient W/ Polycystic Liver Disease

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Background: Isolated Polycystic Liver Disease (PLD) is a rare disease related to embryonic malformation that spreads cysts throughout the parenchyma. In the majority of cases, patients are asymptomatic, but increasing size of cysts can cause abdominal pain and distension, which can be worsened by cyst rupture, hemorrhage, or infection. In patients with very large infected cysts, laparoscopic techniques could offer potential technical advantages in drainage. In a case of biliary fistulation to the cyst, further endoscopic treatment may be indicated.

Case: We described a case of recurrent infected liver cysts in a 68-year-old male with polycystic liver disease (PLD). He initially presented with fevers and right upper quadrant abdominal pain. Computed Tomography (CT) scan study showed multiple hepatic cysts with one large cyst containing debris. Laparoscopic fenestration, drain placement and biopsy of the cystic wall were completed leading to symptom resolution. Fluid culture was positive for E.coli and pathology of the cyst wall revealed fibrous stroma. Postoperatively, the drain output became bilious which was concerning for biliary fistula to the cyst. Endoscopic retrograde cholangiopancreatography (ERCP) with sphincterotomy and biliary drain placement were completed. The patient required multiple drain exchanges due to persistent fistula that eventually resolved within a year. In the following year, the patient presented again with similar symptoms. CT scan showed an enlarged peripheral liver cyst located along the original cyst's tract, pushing up against the diaphragm. Percutaneous drainage was done at this time due to its proximity to the skin. Culture fluid was positive for streptococcus anginosus. Drain study showed no biliary connection. The drain was removed 4 weeks later, and the patient is currently doing well. Of note, the patient was given an extended period of antibiotic treatment as well.

Conclusion: History of liver cysts with biliary fistula carries high risk of recurrence as illustrated in this case. In the event of biliary fistulation to the cyst, sphincterotomy and biliary stenting are feasible in allowing the biliary fistula to close.

P305

Minimally Invasive Hepatectomy: Trends and Opportunities for Improvement

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Introduction: We aimed to examine national trends in minimally invasive (MIH) versus open (OH) hepatectomy and identify opportunities for improvement.

Methods: 25,393 partial, left, right, and extended hepatectomies were identified from 2014–2019 in the participant use file of the American College of Surgeons National Surgical Quality Improvement Program with hepatectomy targeted procedure variables. The distribution of hepatectomies performed over years was examined, with particular focus on approach (open/laparoscopic/robotic), indication (benign/malignant), type of resection (minor versus major hepatectomy, defined as any hemi or extended hepatectomy), and risk-adjusted 30-day outcomes. Independent predictors of receipt of MIH were identified by multivariable logistic regression.

Results: The number of hepatectomies being captured has increased every year from 2014 to 2019. The proportion of MIH (laparoscopic/robotic) increased from 24% in 2014 to 29% in 2017 then plateaued to 28% from 2018–2019 ($P < 0.001$). Laparoscopic approach increased from 22% in 2014 to 26% in 2017 then decreased to 23% in 2019 whereas robotic approach increased from 1.6% in 2014 and steadily increased every year to 4.3% in 2019 ($P < 0.001$). Most MIH is performed for benign (60%) versus malignant (40%) indications ($P < 0.001$). In patients who underwent MIH for malignant conditions, 86% were for tumors < 5 cm and 14% were for tumors > 5 cm or with major vascular invasion ($P < 0.001$). There were more minor (84%) versus major (16%) MIH ($P < 0.001$). Independent predictors of MIH include: minor hepatectomy (OR = 3.12, $P < 0.001$), age ≥ 80 years old (OR = 1.18, P = 0.004), operative year (2017 OR = 1.23, $P < 0.001$; 2018 OR = 1.14, P = 0.019; 2019 OR = 1.13, P = 0.028), and benign diagnosis (OR = 2.21, $P < 0.001$). MIH compared to OH was associated with improved postoperative 30-day composite outcome on multivariable analysis encompassing reoperative interventions including percutaneous/endoscopic procedures, any end organ failure including Grade B/C liver failure, or death (OR = 0.61, $P < 0.001$).

Discussion: MIH has increased since 2014 with plateau from 2017–2019. There has been increased use of robotic with subsequent decrease in laparoscopic approach, suggesting the robotic platform has not substantially increased adoption of MIH. Despite increased use of MIH, most of the cases are minor hepatectomies, typically for benign disease, and tumors < 5 cm if there is a malignant indication. As oncologic patients may derive the most benefit from MIH with respect to improved perioperative outcomes and thus enhanced recovery for receipt of adjuvant therapies, increased focus on expanding MIH for malignant indications, major hepatectomies, and larger tumors should be considered.

P306

Laparoscopic Anatomic Liver Resection of Segment 2 by Glissonean Approach

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Background: Anatomic liver resection (ALR) has been established to eliminate the tumor-bearing hepatic region with preservation of the remnant liver volume for liver malignancies. Recently, laparoscopic ALR has been widely applied despite that it is technically demanding. Although laparoscopic left lateral sectionectomy would be useful for tumors in segments 2, the preservation of the nontumor-bearing segment 3 could not be often considered. In this study, we present the feasibility and technical aspects of laparoscopic segmentectomy 2.

Methods: Five patients were included: 2 for hepatocellular carcinoma, 2 for colorectal liver metastasis, and 1 for hepatic angiomyolipoma which was preoperatively diagnosed with hepatocellular carcinoma. They underwent pure laparoscopic segmentectomy 2 by means of Glissonean approach. In all patients, preoperative 3D simulation images from dynamic CT were reconstructed using a 3D workstation. The layer between hepatic parenchyma and the Glissonean pedicle of segment 2 (G2) was dissected to encircle the root of G2. After clamping or ligation of the G2, 2.5 mg of ICG was injected intravenously to identify the boundaries between the segment 2 and 3 with negative staining method under near-infrared light. Parenchymal transection was performed from the caudal side to the cranial side according to the demarcation on the liver surface and the intersegmental plane on which the main trunk of the left hepatic vein was exposed.

Results: The median operative time for five patients were 286 min. The median blood loss were 20 ml, and no transfusion was necessary. The mdian length of hospital stay patients were 8 days. There were no complication.

Conclusion: Laparoscopic segmentectomy 2 by Glissonean approach is a feasible and safe procedure to preserve nontumor-bearing hepatic region.

P308

Resection of Giant Hepatic Hemangioma Resolves Coagulopathy

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Introduction: Kasabach-Merritt phenomenon (KMP) is classically described in infants with cavernous hepatic hemangiomas. However, the incidence of KMP in adults with cavernous hepatic hemangiomas is extremely rare. Here, we report the case of an adult patient with KMP due to a giant hepatic hemangioma which resolved after surgical resection.

Case Presentation: The patient is a 42 year old male with an incidentally discovered 16-cm hepatic hemangioma during a workup for asymptomatic anemia. Over the course of 9 years, the hepatic hemangioma slowly grew to 25-cm with compression of intrahepatic structures and displacement of adjacent viscera. The patient also experienced worsening shortness of breath, abdominal fullness and early satiety, and varicose veins of the lower extremities. During this time, laboratory studies occasionally demonstrated recurrent mild anemia, mild thrombocytopenia, and mild elevation of prothrombin time. Pre-operative angioembolization of tributaries from the right inferior phrenic vein and branches of the right hepatic artery in segments VI and VII was performed. Open resection via a bilateral subcostal "chevron" incision was accomplished within 8 min of Pringle time using rapid serial division of the abutting parenchyma in segments VI, VII, and VIII. In the immediate post-operative period, the patient required transfusion of platelets, fresh frozen plasma, and tranexamic acid for coagulopathic bleeding. His coagulation studies responded well, and the rest of his hospital course was uneventful. He was discharged on post-operative day #6 and continued to have a sustained platelet count above 200 K/μL on post-operative day #15 in clinic.

Conclusion: Giant hepatic hemangiomas may cause a low-level coagulopathy at baseline akin to KMP. Expectant management of these tumors with this behavior might place the adult patient at risk for overt Kasabach-Merritt syndrome, especially in the setting of trauma. Further studies are warranted.

P309

Spontaneous Subcapsular Hematoma and Hepatic Rupture in the Setting of Pre-eclampsia or Hellp Syndrome: Report of Two Cases and a Systematic Literature Review

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Spontaneous subcapsular hematoma (SCH) and hepatic rupture (HR) are rare complications of pre-eclampsia (pre-E) and hemolysis, elevated liver enzymes and low platelets (HELLP) syndrome. We present two patients with HR in the context of HELLP syndrome managed surgically.

Methods: A chart review of two patients and a literature review (2009—2021) were performed. Seventeen variables were analyzed using RStudio (R-Foundation, Boston, MA).

Case 1: A 32-year old G1P0 at 27 + 3 weeks gestation presented with HELLP syndrome. Surgery was consulted for hemoperitoneum and HR during C-section. MTP was activated: 2 packed red blood cells (pRBCs), 1 frozen plasma (FP). Packing with Arixtra powder (GlaxoSmithKline, Triangle Park, NC), Surgicel gauze (Johnson & Johnson, New Brunswick, NJ), and Surgiflo (Johnson & Johnson, New Brunswick, NJ) controlled hemorrhage. Estimated blood loss was 1800 mL. The patient required 1 day in the surgical intensive care unit (SICU). Patient discharged home on postoperative day (POD) 11. Patient and child are both doing well at four months.

Case 2: A 35-year old G1P0 at 35 + 3 weeks gestation presented with HELLP syndrome. Surgery was consulted for hemoperitoneum and HR during C-section. MTP was activated: 4 pRBCs, 3 FP, and 3 apheresis platelets. Packing with FloSeal (Baxter International Inc, Deerfield, IL) and Surgicel gauze (Johnson & Johnson, New Brunswick, NJ) controlled hemorrhage. Estimated blood loss was 3680 mL. Abthera (Acelity, San Antonio, TX) closure was placed. The patient required 4 days in the SICU and 3 additional pRBCs. Fascial closure was performed on POD 2 and the patient was discharged home on POD 12. Patient and child are both doing well at three years.

Results: Forty-four reports were analyzed: maternal mortality 4/44 (9.1%), fetal loss 15/44 (34.1%), intact SCH 6/44 (13.6%), HR 36/44 (81.8%), mean blood loss 3000 mL., 11/44 (25.0%) underwent embolization, 35/44 (79.5%) required surgery, 2/44 (4.5%) required hepatic resection, 1/44 (2.3%) required liver transplantation. Thirteen reports of HR required surgery and MTP activation: mean pRBCs 9.0 ± 10.0, FP 10.0 ± 6.7, apheresis PLT 4.0 ± 2.6. Mean ICU stay was 7.3 ± 5.8 days and mean hospital stay was 18.8 ± 14.6 days.

Conclusion: SCH and HR are associated with significant maternal and fetal mortality. Control of hepatic rupture with packing, hepatic embolization, hepatic resection, and even liver transplantation may be required for these patients.

P310

Factors Predicting Mortality in Acute Mesenteric Ischemia: A Prospective Observational Study

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Introduction: Acute mesenteric ischemia (AMI) accounts for about 1:1000 acute hospital admissions. Clinical presentation is nonspecific and is characterized by an initial discrepancy between severe abdominal symptoms and a paucity of specific signs. It remains a diagnostic challenge for clinicians, and the delay in diagnosis contributes to the continued high mortality rate. This high mortality rate prompted us to undertake this study. If the predictive factors are known, the surgeon can employ heightened surveillance in high-risk cases. There is also sparse literature in the Indian setup to guide treatment. Much of the data comes from case reports and often small, retrospective series. The aim of this study is to define prognostic factors that predict mortality in acute mesenteric ischemia.

Methods: The study is a prospective observational non-interventional study to determine the factors predicting mortality in acute mesenteric ischemia conducted at a university hospital in Mumbai, India. All non-pregnant adult patients with diagnosed ischemic bowel disease were included in the study. Outcome event is mortality within a 30-day period post admission. Multivariate analysis of the factors with p value < 0.05 in univariate analysis was done to find out factors independently associated with mortality in AMI.

Results: Out of 44 patients in the cohort, the median age was 61 years and males constituted 70.5% of the study population. All patients underwent emergency exploration and gangrenous bowel was found in all cases. 27 (61.4%) patients had greater than 90 cm of gangrenous bowel on exploration. Superior mesenteric artery was the commonest vessel involved in 39 (88.6%) of the cases. There were 18 (40.9%) patients with 30-day mortality in this study cohort. Age, tachycardia, tachypnea, refractory hypotension, hypoxia on arterial blood gas analysis and portal venous gas on CT were significantly associated with mortality (p value < 0.05). Patients who underwent an ostomy during the surgical exploration were 5 times more likely to die compared to the group which underwent a resection with anastomosis. (OR-5, p value < 0.05).

Conclusion: Acute mesenteric ischemia is a geriatric abdominal emergency that is associated with high mortality. For risk stratification of patients with acute mesenteric ischemia, we identified the following significant predictors of mortality in a prospective observational study: aging, presence of comorbidities unstable hemodynamics on admission, refractory hypotension, hypoxia on blood gas analysis, and presence of portal venous gas on imaging.

P312

Perioperative Music: A Survey and Interview-Based Analysis of Prevalence, Demographics, and Perception in British Columbia, Canada

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Background: Perioperative music describes the use of background music during a surgical procedure that is intended to benefit those involved during the operation. Surgeons often describe anecdotal perioperative music experience; however, little research has been conducted into the topic. This study examines the attitudes of surgeons towards perioperative music and correlates parameters such as surgeon age and specialty with said attitudes. Opinions on the effects of characteristics such as volume and genre were explored, as well as surgeons' beliefs regarding the effects of perioperative music on concentration, communication, surgical efficiency, and error rate.

Methods: Qualitative data was collected regarding beliefs about perioperative music in two phases. Phase I involved distribution of an online survey to surgeons operating in British Columbia, Canada. Phase II allowed survey respondents to further discuss their beliefs through a series of telephone interviews.

Results: 56 of 75 surgeons fully completed the survey; of those, 6 respondents (10.7% of total) consented to be interviewed. Surgeons significantly disagreed that perioperative music decreases error rate ($n = 50$, $p < 0.001$); however, volume influenced both perceptions of error rate as well as beliefs regarding concentration, communication, and efficiency ($n = 50$, $p < 0.001$ for all).

Conclusions: Although participation was lower than expected, perioperative music in the operating room was found to be highly dependent on individual surgeon preferences. However, when music is proactively managed, surgeons do not generally believe that they are affected by music in the operating room. Further study would benefit from a larger sample size.

P313

Papillary Carcinoma of Male Breast

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Male breast cancer is rare, incidence is 1% of all breast cancer. Intracystic papillary carcinoma is extremely rare, representing 5–7.5% of all male breast carcinomas. It commonly occurs in older populations. Prognosis is generally good compared with other histopathologic subtypes.

Our patient is a 71-year-old male with a history of HTN, HLD and 35-pack-year smoking history who underwent a CT lung cancer screening and was found to have a left breast retroareolar mass in addition to small bilateral lung nodules. Upon further inquisition, the patient admits to noticing a small left breast mass since high school with occasional clear and brown-tinged nipple discharge, but no imaging or intervention was pursued. The patient underwent a diagnostic mammogram which revealed a high density macrolobulated mass seen in the central left breast, BI-RADS 5. Ultrasound demonstrated a complex cystic and solid multilobulated mass $3.5 \times 2.5 \times 2.5$ cm. He subsequently underwent a biopsy and clip placement that revealed encapsulated papillary carcinoma that is ER/PR positive, HER-2 not assessed. Pathology also demonstrated multiple smaller foci of DCIS not involving margins. The patient underwent a left breast lumpectomy and tolerated the procedure well. He subsequently developed an abscess requiring surgical drainage, but since then has not had further tenderness and is feeling well. The patient declined genetic testing and radiation therapy but is considering tamoxifen treatment.

This case represents the importance of early detection of breast cancers in both women and men. The majority of inherited breast cancer in men is associated with BRCA2 mutations rather than BRCA1, highlighting the importance of genetic screening. Most male breast cancers present late, often with more than 40% of individuals having stage III or IV disease.

P315

Ladd's Procedure in Adults Presenting with Intestinal Malrotation: Results of Long-Term Follow-Up with SF-36 General Health Assessment

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Introduction: Intestinal malrotation rarely presents in the adult population. There is a paucity of data in the literature regarding long-term follow up of patients who underwent Ladd's procedure as adults. Herein is described the short- and long-term follow up of a case series of adult patients who underwent Ladd's procedure for intestinal malrotation.

Methods: The medical charts of all patients older than 18 years of age who underwent Ladd's procedure for intestinal malrotation at our hospital since 2009 were reviewed retrospectively. The data collected from chart review included demographics, presenting symptoms, and short-term follow-up symptoms (within 30 days of procedure). To obtain long-term follow-up, a letter was sent soliciting consent to complete an SF-36 Health Survey over the phone. Survey results were scored on a scale of 1–100 and an average score for each subcategory of the survey were collected.

Results: Twenty-one adult patients underwent Ladd's procedure for intestinal malrotation between 2009–2021. Eighty one percent were performed laparoscopically. The average age at the time of the procedure was 30.8 years and 76% were female. The most common presenting symptom was abdominal pain (100%). Of the sixteen patients who returned for short term follow-up, 68% reported resolution of chronic symptoms. For long-term follow-up, six out of the 21 patients agreed to participate in the SF-36 questionnaire. Average long-term follow up time was 80 months. Out of the 9 subcategories of the SF-36, the average score was highest in physical functioning (96%). The average score was 83% in the subcategory that assesses pain.

Conclusions: Adults presenting with intestinal malrotation commonly present with abdominal pain that can be acute and/or chronic. Although the SF-36 assessment of pain is not specific to the abdomen, these results suggest that on average the overall pain assessment and physical functioning in these patients is good. Ladd's procedure for adults with intestinal malrotation not only addresses acute symptoms, but may also improve chronic symptoms in the long term.

P316

Voice Hoarseness with Reflux as Suspected Etiology: Outcomes Based on Clinical Evaluation

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Introduction: Determining if laryngopharngeal reflux (LPR) and/or gastroesophageal reflux disease (GERD) is the cause of voice hoarseness is difficult. Nevertheless, the approaches to establishing LPR/GERD as the cause of hoarseness vary by practitioner. Our purpose was to determine if additional diagnostic assessment beyond clinical diagnosis improves treatment outcomes for voice hoarseness in patients with suspected LPR/GERD.

Methods: A retrospective review was performed of patients referred for suspected LPR/GERD with a primary complaint of voice hoarseness/changes who underwent evaluation, treatment, and follow-up. Data gathered included demographic data, initial visit specialty, presenting symptoms, comorbidities, prior treatment to referral and outcomes, evaluations and treatments after referral and outcomes, treatment types after referral, final diagnosis, time to final diagnosis, and total evaluation and treatment time. Inclusion criteria were patients age $\geq$ 18 years referred for management of LPR/GERD as a cause of voice hoarseness. A chi-squared test and Fisher's exact test were used for analysis.

Results: 134 patients were included. 88 patients (66%) received additional evaluation. The table presents the additional testing done. Treatments included protein-pump inhibitors, H2-blockers, speech therapy, antireflux surgery, lifestyle changes, nasal steroid spray, vocal hygiene measures, and vocal cord lesion removal. No one specific type of evaluation that was significantly associated with improvement of voice symptoms. There was no difference in patient improvement in patients undergoing or not undergoing additional evaluation (59% vs 64%, p = 0.71).

Conclusions: Hoarseness and voice changes in adults with LPR/GERD as the suspected cause remains a difficult relationship to establish. Additional evaluations may not provide any measurable benefit to patients seeking relief for voice hoarseness/changes due to suspected GERD/LPR.

Table Additional Evaluation Type and Voice Symptom Outcome

Additional Evaluation Type	Total Number Received	No Symptom Improvement	Symptom Improvement	p-value
Endoscopy	38	16 (42%)	22 (58%)	0.62
Barium swallow	18	8 (44%)	10 (56%)	0.60
pH monitoring	28	8 (29%)	20 (71%)	0.21
Videostroboscopy	59	22 (37%)	37 (63%)	0.75
Manometry	24	8 (33%)	16 (67%)	0.54
Receving any additional evaluation	88	36 (41%)	52 (59%)	0.49
No Additional Evaluation	47	17 (34%)	30 (64%)	

P317

Perception Variability of Surgical Irrigation Fluid Temperature

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Introduction: Fluids are often used for irrigation during surgical procedures. Fluid's temperature directly affects the exposed tissue and the body temperature. Therefore, the recommended practice is to use euthermic fluids to be homeostatic and optimize patient care. In the current practice, there is no precise measurement of the fluid temperature prior to use in irrigation. Hand checking and feeling the fluid temperature by the surgical technician is the commonly used way. This subjective measurement is not accurate. It relies on sensing the temperature by the hand skin under the gloves. Furthermore, the immediate available irrigation fluid has likely acquired the room temperature. The purpose of the study is to assess the accuracy of the currently used method of checking irrigation fluids temperature by hand immersion.

Method: Two sets of fluids were prepared. One of them was made at the normal body physiologic temperature (37° Celsius). The other one was adjusted for a temperature that is close to the ambient temperature comfortable to the body (30°).

Surgical technicians and circulating nurses at the local hospital were invited to voluntarily participate in the study. Participants wear gloves and immerse each of their hands in one of the two containers then choose one of the following answers for each of the two contains: 1) Appropriately warm for irrigation; 2) too cool (cold) for irrigation; and 3) too warm (hot) for irrigation. Data were collected and interpreted to evaluate perception of the surgical technicians of appropriate temperature.

Results: Twenty-seven surgical technicians from one local hospital participated in the study. About half of participant perceived the normal physiologic fluid temperature as too hot for use in irrigation. While the fluid that is 7 degrees below the physiologic temperature was perceived as appropriate and physiologic by about one fourth of participants. Details of the participants' perception of the fluid temperature for the two fluid types are presented in Table 1.

Conclusions: Perception of surgical Irrigation fluid temperature by hand immersion is inaccurate. Standard objective methods of measuring the temperature are recommended.

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Pulseless Electrical Activity (PEA) Associated With Pheochromocytoma: Report of Two Cases

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Introduction: Pheochromocytomas are rare, catecholamine-producing adrenal tumors presenting with refractory hypertension, headaches, palpitations, and diaphoresis. Patients may also present with cardiac complications, including arrhythmia, myocardial infarction, heart failure, or pulmonary edema. In addition, reversible stress cardiomyopathy is often confirmed by cardiac ECHO in such patients. Although studies have linked rare incidences of cardiac arrest, PEA arrest is an uncommon initial presentation. We report two patients who suffered PEA arrest in the setting of pheochromocytoma.

Case presentation:

Case 1: A 60-year-old-man with a history of hypertension was successfully resuscitated from pulseless electrical activity (PEA) cardiac arrest following cervical spine surgery. His evaluation included a computed tomography (CT) scan of the abdomen demonstrating a right adrenal gland mass, later confirmed to be a pheochromocytoma. Laparoscopic posterior adrenalectomy was performed without complication.

Case 2: A 44-year-old man presented with nausea, dizziness, and a systolic BP of over 200. His evaluation included a CT of the abdomen, demonstrating a left adrenal mass, which was later confirmed to be a pheochromocytoma. During his surgical procedure, he suffered a PEA arrest, and the procedure was terminated. Cardiac ECHO demonstrated apical hypokinesis and stress cardiomyopathy. His left ventricular ejection fraction (LVEF) was 30–35%. A return to the operating room was complicated by hypertensive crisis, and again the resection of the tumor could not be performed. Laparoscopic posterior adrenalectomy was successful after an effective pharmacologic blockade on the third attempt. Following resection of the tumor, the patient's left ventricular function returned to normal with the recovery of an LVEF of 60 – 65%.

Discussion/Conclusions: These reports highlight the potentially life-threatening cardiac complications, including hypertension, heart failure, and sudden death, which can be seen in patients with pheochromocytomas. Although presentation with PEA arrest is rare, approximately 12% of patients with pheochromocytomas will demonstrate some form of cardiac complication. A wide range of dysrhythmias, including ventricular fibrillation, are described in association with pheochromocytomas. Stress cardiomyopathy, which resolves after resection of the pheochromocytoma, is not uncommon in such patients. Curative therapy requires early identification, strict medical management, and surgical resection to limit long-term cardiac complications. Both of our patients presented with palpitations, diaphoresis, and hypertension; the management of these symptoms by an interdisciplinary team, including cardiology, endocrinology, surgery, and anesthesiology, is essential to avoid cardiac complications associated with pheochromocytoma.

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Outcomes of Minimally invasive versus Open Lysis of Adhesions in the Geriatric population: A 5-year NSQIP Review

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Introduction: Lysis of adhesions remains the standard surgical care for obstruction following the failure of conservative management. It has been previously shown that laparoscopic intervention results in better morbidity and mortality. The surgical outcomes of the elderly population represent an important marker to promote health equity.

Methods: Patients greater than 70 years of age who underwent lysis of adhesions were identified from the ACS-NSQIP database (2015–2019) using appropriate CPT codes. Chi square and student's t-test were used to compare surgical characteristics and outcomes including major complications, length of procedure and readmission. Factors with $p < 0.05$ were included in the multivariate logistic regression for each outcome. A two-sided p value < 0.05 was considered significant.

Results: Of the 17,160 procedures identified, 5679 (33%) procedures were performed in the patients over the age of 70. 37% of these procedures were attempted to be done via the minimally invasive approach. On univariate analysis factors such as operative time, hospital length of stay, days from operation to death, days from operation to discharge were found to be statistically different. Patients who underwent an open approach had a higher rate of still in hospital at 30 days (OR 2.16), superficial infection (OR 3.32), dehiscence (OR 11.28), reintubation (OR 3.03), failure to wean at 48 h (OR 3.52), renal failure (OR 2.02), urinary tract infection (OR 1.56), cerebrovascular accident (OR 2.65), cardiac arrest (OR 2.36), postoperative transfusion requirement (OR 2.88), DVT (OR 2.04), and mortality within 30 days (OR 4.29). When controlling for significant preoperative risk factors and surgical characteristics, the risk of mortality in open compared to minimally invasive remained significant (OR 2.22, $p < 0.001$).

Conclusions: When examining open versus minimally invasive lysis of adhesions in the geriatric population within a national sample, the risk of an adverse outcome for the open procedures is significantly higher. Clinicians should consider a laparoscopic approach for geriatric patients presenting for lysis of adhesions. Further research of the situations which clinicians choose open procedures is necessary to help mitigate these identified risks.

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Watchful Waiting for Large Primary Splenic Cysts

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Background: Non-parasitic primary splenic cysts (NPSC) are rare, and most are diagnosed incidentally. Symptomatic cysts are treated surgically while small asymptomatic cysts are observed. However, the management of large($\geq$ 5 cm) asymptomatic cysts remains controversial. While traditional practice recommends surgery to avoid rupture, there is a lack of evidence guiding management. The aim of this study was to describe the natural history and outcomes of operative and non-operative management for large NPSC.

Methods: Patients in whom a splenic cyst was diagnosed between January 2004 and December 2019 were identified from the data warehouse at an academic health care network and those medical records were reviewed. Patients with a NPSC $\geq$ 5 cm with at least one additional follow-up visit (radiologic and/or clinical) were included. Pediatric patients, patients with non-primary or solid splenic lesions, and those with NPSC $<$ 5 cm were excluded. All radiographic images were reviewed to track cyst size progression. Data presented as median(IQR).

Results: The data warehouse identified 512 unique medical records for review. After 12 exclusions (5 non-cystic mass, 2 pediatric, 2 non-splenic cysts, 3 no follow-up), there were 500 patients with splenic cysts. Of these, 68 had no reported size, 410 had cysts $<$ 5 cm and 22 patients with cysts $\geq$ 5 cm. One patient had elective laparoscopic splenectomy elsewhere without further information about indication, leaving 21 patients included in this case series. Overall, 8 patients were symptomatic at initial presentation and underwent surgery at our institution. Of these, 2 presented acutely to the emergency department: 1 patient with hemoperitoneum who required admission for transfusions followed by elective laparoscopic splenectomy and 1 who presented with crescendo abdominal pain and underwent same-admission laparoscopic cyst unroofing. The remaining 6 symptomatic patients had elective surgery due to abdominal or shoulder pain (4 cyst unroofing, 1 splenectomy, 1 partial splenectomy). The other 13 patients were asymptomatic (10 female, age 49.2 (IQR38.1–63.7) years). Two patients underwent surgery due to personal preference (cyst unroofing and partial splenectomy). Of the 11 patients who were followed, initial cyst size was 9.1 cm(IQR5.85–11.4 cm). After follow-up of 33(IQR23.5–78.5) months, there was no change in median cyst size (0 cm(IQR -1-0 cm)) and no patient underwent elective or emergency intervention for the NPSC.

Conclusion: In this case series, asymptomatic patients managed non-operatively for large NPSC did not become symptomatic or require emergency intervention for spontaneous rupture during the study period. This supports a watchful waiting approach for asymptomatic large NPSC.

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Overexpression of Antiapoptotic Gene Associated with Barrett's Esophagus and Adenocarcinoma of the Esophagus

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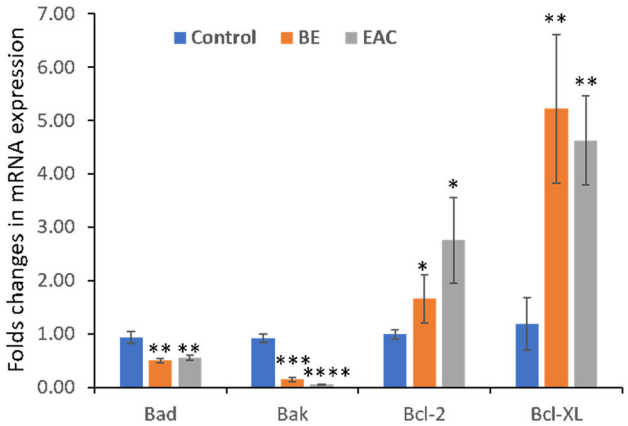

Introduction: The incidence of obesity and esophageal adenocarcinoma has been increasing in the past three decades. Obesity is considered one of the risk factors in the development of EAC. Obesity-associated metabolic changes result in an increase in insulin-like growth factor-1 (IGF-1), free fatty acid (FFA), and diacylglycerol (DAG) levels. FFA and DAG are potent activators of protein kinase C delta, a novel PKC isozyme ubiquitously expressed among cells. IGF-1 enhances the enzymatic activity of PKCdelta. In this prospective study, we hypothesize that obesity-associated PKCδ overexpression induces anti-apoptotic factors.

Methods: We recruited patients with either Barrett's disease or esophageal adenocarcinoma with or without Barrett's disease after IRB approval. We collected 19 normal, 8 Barrett's, and 15 EAC tissue samples during endoscopy or esophagectomy. The samples were analyzed for the presence of PKCδ, pro-apoptotic (Bad, Bax, Bak), and anti-apoptotic (Bcl-2, Bcl-XL) factors expression levels by immunofluorescence and RT-PCR. We compared levels of expression between normal, BE, and EAC tissue.

Results: Our results showed increased expression of PKCδ, anti-apoptotic factors, and decreased expression of pro-apoptotic factors in BE and EAC samples compared to normal tissues. The fold change in mRNA expression of proapoptotic markers Bad, Bak, decreased from 0.94 and 0.91 in Normal to 0.50 and 0.14 in BE and 0.55 and 0.05 in EAC. Similarly, increased expression of anti-apoptotic factors Bcl-2 and Bcl-xL 0.99 and 1.19 in Normal to 1.66 and 5.22 in BE and 2.76 and 4.62 in EAC (Figure). The average BMI of all the patients was 28.9 kg/m2. There were 7 obese patients in the study (average BMI = 34.0 kg/m2) and 9 were non-obese (average BMI = 24.90 kg/m2).

Conclusions: An increased expression of PKCδ, antiapoptotic genes, and decreased expression of proapoptotic genes in BE and EAC suggest the role of dysregulated apoptosis in BE and EAC. These results need to be further validated with an increased number of patients and in-vitro studies.

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Distractions in the Operating Room: A Survey of the Healthcare Team

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Background: Distractions during surgical procedures are associated with team inefficiency and medical error. Little is published about the healthcare provider's perception of distraction and its adverse impact in the operating room. We aim to explore the perception of the operating room team on multiple distractions during surgical procedures.

Methods: A 26-question survey was administered to surgeons, anesthesiologists, anesthetists, nurses, and scrub technicians at our institution. Respondents were asked to identify and rank multiple distractions, and how each distraction might affect the flow of surgery.

Results: There were 160 responders for a response rate of 19.18% (160/834), of which 71 (44.1%) male and 82 (50.9%) female, 48 (29.8%) surgeons, 59 (36.6%) anesthesia, and 53 (32.9%) OR staffs. Responders were classified into junior group (< 10 years of experience) and senior group (≥ 10 years). There was a higher proportion of juniors in anesthesia profession (43, 44.8% vs 16, 25%, $p = 0.035$) but no difference in gender between the two groups. Auditory distraction followed by equipment is the most distracting factor in the operating room in both junior and senior groups, with no difference in gender, professionals. Vision is the least distracting factor. Both groups considered music a common distractor with a positive impact on the flow of surgery. Both groups considered phone calls or pagers common distractor, with a high level of bothersome and negative impact on the flow of surgery. While more junior considered alarm in the operating room had negative impact (47, 50%), senior responded it had no impact (26, 40%). Even though both groups considered staff changing during cases associated with a certain level of negative impact, more seniors considered it a distractor (37, 40.2%: 35, 54.7%). Slightly higher proportion of junior considered poor ergonomics a distractor (76, 88.4%: 46, 74.2%), $p = 0.025$), associated with higher level of bothersome (76, 87.4%: 43, 72.9%, $p = 0.027$), and negative impact (82, 94.3% vs 43, 70.5%, $p < 0.0001$). A slightly higher proportion of senior consider team availability associates with a higher level of bothersome (74, 83.1% vs 57, 95%, $p = 0.029$).

Conclusions: To our knowledge, this is the first survey studying the perception of surgery, anesthesia, and OR staff on various distractions in the operating room. Fewer unnecessary distractions might improve the flow of surgery, improve OR teamwork, and potentially improve patient outcomes.

Ranking

	Total N= 160	Male N= 71	Female N= 82	Surgery N= 48	anesthesia N= 55	OR staffs N= 53	<10 years N= 96	>10 years N= 64
Auditory (ranking) (n, %)	1 (67, 41.6)	1 (30, 42.3)	1 (36, 43.9)	1 (20, 41.7)	1 (33, 55.9)	1 (14, 26.4)	1 (41, 42.7)	1 (26, 40.6)
Visual (ranking) (n, %)	5 (9, 5.6)	5 (4, 5.6)	5 (5, 6.1)	4 (3, 6.3)	5 (1, 1.17)	5 (5, 9.4)	5 (8, 8.3)	5 (1, 1.6)
Communication (ranking) (n, %)	4 (16, 9.9)	3 (8, 11.3)	4 (7, 8.5)	3 (6, 12.5)	4 (3, 5.1)	4 (7, 13.2)	4 (10, 10.4)	3 (6, 9.4)
Equipment (ranking) (n, %)	2 (34, 21.1)	2 (15, 21.1)	2 (18, 22)	2 (13, 27.1)	2 (8, 13.6)	2 (13, 24.5)	2 (15, 15.6)	2 (19, 29.7)
Environment (ranking) (n, %)	3 (19, 11.8)	3 (8, 11.3)	3 (11, 13.4)	4 (3, 6.3)	2 (8, 13.6)	3 (8, 15.1)	3 (14, 14.6)	4 (5, 7.8)

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Atypical Presentation of Appendiceal Neuroendocrine Tumors

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Gastrointestinal neuroendocrine tumors have an incidence of 2–5/100,000, appendiceal neuroendocrine tumors being the most common. Diagnosis is typically in the 2nd and 3rd decades of life. The most common presentation is that of acute appendicitis. A simple appendectomy is usually curative in patients with appendiceal neuroendocrine tumors < 1 cm without lymphovascular invasion. A right hemicolectomy is indicated in tumors larger than 2 cm, located at the base, with mesoappendix, vascular, or perineural infiltration. The aim of this topic discussion is to inform and provide evidentiary support of a less common presentation of neuroendocrine neoplasia of the appendix.

Our patient is a 31 year old female with history of GERD and anemia who presented to the ED with two days of right lower quadrant pain associated with nausea, decreased appetite and decreased bowel movements. WBC was elevated to 11.8, and CT showed small bowel obstruction with abnormality of the terminal ileum. The patient was ultimately taken to the operating room for a diagnostic laparoscopy which revealed a large hard mass on the lateral aspect of the terminal ileum for which she underwent an extended right hemicolectomy. Final pathology was consistent with a well-differentiated neuroendocrine tumor of the appendix with negative margins, no perineural invasion, and 4 of 24 lymph nodes positive, consistent with a pT4N1M0 malignancy. Oncology recommended surveillance with imaging and tumor markers (chromogranin A, 5 HIAA) every 3–6 months.

This case study highlights the importance of identifying potential neuroendocrine malignancy in an SBO presentation. Furthermore, it emphasizes recognizing the need for a more extensive operative intervention based on tumor size indicated in preoperative imaging once the suspicion for a neuroendocrine etiology has been raised. In conclusion, GI neuroendocrine neoplasia should be well within the differential when encountering a patient with obstruction secondary to a small bowel mass lesion.

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A Novel Technique utilizing Microlyte AG for the Prevention of Surgical Site Infections: Technical Description and Early Experience

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Background: MicroLyte® Ag, is a patented (K153756) synthetic bioresorbable antimicrobial surgical matrix that provides a sustained release of antimicrobial silver ions for > 3 days to efficiently kill bacteria residing on the wound bed. The material is bioresorbable and can be enclosed into a surgical incision, thus it is particularly suited to clearing microbial contamination in the surgical incision field and preventing superficial and deep tissue Surgical Site Infections (SSIs). Here we propose a novel technique for the use of Microlyte Ag in the subcutaneous tissue during abdominal wound closure to prevent SSI. We hypothesize that this technique could be a safe and effective strategy for further reducing the risk of SSIs in high-risk patients.

Methods: Patients who were deemed to be at high risk for SSI were candidates for treatment. After fascial closure of midline laparotomy incisions, strips of Microlyte Ag were placed in the subcutaneous tissue. (Fig. 1) The subcutaneous tissue and skin were then closed using absorbable suture or staples. 13 patients in total were included to make up our early experience with this technique. The primary outcome was superficial or deep SSIs as defined by the CDC within 30 days of the index operation, and patients were excluded who were lost to follow up prior to 30 days.

Results: Of the 13 patients that were included in this mini-series, 7 patients were male and 6 were female, with an average age of 61.9. The majority of these were contaminated (2) or clean contaminated (6), with 4 patients being current smokers, 5 being obese and 3 being diabetic. Of all 13 patients, 2 patients suffered some minor wound cellulitis treated with antibiotics alone, one patient had superficial SSI treated with antibiotics and not requiring further intervention, and one patient had deep SSI requiring incision and drainage. Overall, there were no major complications, no mortalities, and no adverse reactions due to MicroLyte.

Conclusions: The utilization of silver impregnated biofilms for prevention of SSIs is a novel concept. In our early experience with high risk patients, there have been no adverse reactions or major wound complications, with only two out of 13 patients developing 30-day SSI and only one of those requiring intervention greater than oral antibiotics. Further study of this technique in a prospective, randomized controlled fashion is needed to establish its safety and efficacy.

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Low Insufflation Colorectal Surgery (LICS)—Pilot Study of Feasibility and Safety Outcomes

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Introduction: Lower intra-peritoneal pressures have been reported to offer improved quality of functional recovery, analgesic use, and length of stay after cholecystectomy, gynecologic and urologic surgery. The safety and merit of combining low pressure pneumoperitoneum with neuromuscular blockade (NMB), however, remains unclear in the realm of colorectal surgery.

Methods and Procedures: Prospective, single-blind pilot study of adults undergoing laparoscopic colectomy. Patients received low insufflation (8 mmHg) with NMB with Sugammadex reversal (LICS cohort) or conventional therapy (control) with standard insufflation (15 mmHg). The primary endpoint was quality of functional recovery, measured using the QoR-40 questionnaire before and 24 h after surgery. Secondary outcomes included intra- and post-operative parameters including end-tidal CO2 (ETCO2), peak airway pressure (PAP), rate of conversion to open, and operative time. Pain was also measured using the Visual Analog Scale (VAS), at 12 and 24 h after surgery and further characterized intro global, superficial, deep and shoulder tip pain. We also measured 24-h analgesic use (in morphine equivalents), occurrence of post-operative ileus and length of stay. Descriptive statistics were used to describe feasibility and safety outcomes.

Results: A total of 44 patients were consented, with 27 patients in the LICS cohort and 17 in the control group. Complete data were obtained for 19 LICS patients and 14 patients in the control arm (N = 33). Both groups were comparable with respect to key intra-operative variables including median ETCO2 (LICS 36.8 mmHg vs. control 37.2 mmHg), and PAP (LICS 20 mmHg, control 20.6 mmHg). There were no major intra-operative adverse events or conversions to open in either cohort. The LICS cohort had a median operative time of 239 min (vs. 185 min in the control arm) and LOS of 3 days (vs. 3.5 days in the control arm). There was a smaller reduction pre- and post-op median quality of recovery scores with respect to emotions (-8 vs. -11), physical independence (-11 vs. -16), and pain (-4 vs. -8) amongst patients in the LICS cohort compared to those undergoing conventional laparoscopy. While median VAS scores were comparable between cohorts, median analgesic use (in morphine equivalents at 24 h) was higher (82.5 mg) in the LICS arm compared to the control group (68.8 mg).

Conclusions: Low insufflation colorectal surgery with NMB is safe and feasible. It has the potential to offer improved patient-centered outcomes such quality of functional recovery. These findings require validation in a prospective randomized fashion within a larger cohort of patients undergoing laparoscopic colectomy.

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Single Incision Extra-Corporeal Appendectomy: A More Cost Effective Alternative than Conventional Laparoscopic Appendectomy

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Introduction: Single incision appendectomy has emerged as an alternative to the conventional three port appendectomy. In this study we aim to demonstrate that single incision extracorporeal appendectomy (SIEA) is noninferior to conventional laparoscopic appendectomy (CLA) and cost effective.

Methods and Procedures: a retrospective chart review of patients who underwent SIEA and CLA was performed. Both groups were were analyzed in terms of demographic data, comorbidities symptoms, white cell count, Alvarado score, image positivity, American society of Anesthesia (ASA) score, operative time, intraoperative findings, case performance by surgeon level, length of stay, time to advancement of diet, complication rates, readmission rate, as well as cost. Wilcoxon test was used to compare continuous data. Fischer's exact test compared proportions. Significance was defined as $p < 0.05$.

Results: A total of 156 patients (27 SIEA vs. 129 CLA) were reviewed. SIEA and CLA were similar in mean age, gender, comorbidities, laboratory investigations, Alvarado score, image positivity, ASA score, and intraoperative findings ($p > 0.05$ for all). Outcomes were similar between the two groups with regards time to advancement of diet(median time 6 h vs 6 h), post-operative complications (wound infection, deep seated infections 3.7% vs 4.7%), and readmission rates (3.7% vs 2.3%) ($p > 0.05$ for all). Length of stay was slightly shorter in the SIEA than the CLA group, however it was not statistically significant (mean 1.7 days vs 2 days $p = 0.05$). Operative time in SIEA was shorter than CA (median time 50 min vs 75 min, ($p < 0.001$). When considering equipment cost, SIEA had a lower cost compared to CLA (mean cost 236 USD vs 632 USD).

Conclusion: SIEA is noninferior to CLA and associated with at least 63% reduction in cost.

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Proof of Concept for the Application of Fluorescence Lifetime Imaging (FLIm) in Colorectal Surgery

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Introduction: Fluorescence is a promising tool to improve surgical quality, but limitations in fluorophores, lack of sensitivity, and non-quantitative data with current platforms hamper utility. To address limitations, we developed an assessment technique using near-UV light that stimulates tissue autofluorescence- Fluorescence Lifetime Imaging (FLIm). FLIm detects dynamic spectral and temporal changes in tissue composition induced under pathological conditions. Benefits to FLIm from tissue autofluorescence include the lack of exogenous contrast (label-free) and real-time data collection and visualization. Imaging is achieved with a sterilizable handheld probe that can be integrated with any operative platform. FLIm can discriminate between normal, malignant, fibrosed, and inflammatory tissue in humans and animal models. FLIm has been proven a sensitive intraoperative tool for solid brain and head and neck tumor delineation. There has been little application in gastrointestinal (GI) disease to date. The ability to discriminate normal from diseased tissue in the GI tract could add great value to current diagnostic and treatment practices.

The goal of this work was to establish the baseline of FLIm parameters (spectra and lifetime properties) in murine GI tissue. Our hypothesis was that FLIm technology would be adaptable to GI surgery with reproducible results.

Methods: The colorectum, ileum, and mesentery of 12 healthy mice (6 male, 6 female) were collected after necropsy and imaged with FLIm. The FLIm employed a raster-scanned optical fiber probe (400 μm diameter) for multispectral imaging over the visible spectrum (ch1 = 390/18 nm, connective tissue target; ch2 = 435/40 nm, NAD(P)H target; ch3 = 542/10 nm, FAD target; and ch4 = 610/70 nm, lipids/porphyrins target). Channels were tuned to capture fluorescence from structural proteins collagen and elastin, cellular metabolic co-factors nicotinamide adenine dinucleotide (NADH) and flavin adenine dinucleotide (FAD), lipids, and porphyrins.

Results: On average, murine colorectal, ileal, and mesentery tissue exhibited distinct fluorescence lifetime in a spectrally dependent manner. At an individual level, colon and ileum samples presented a mid-section with longer lifetimes than the proximal and distal ends, from different arrangements in connective tissue. The mesentery had distinct areas with lifetime corresponding to simple mesenteric tissue, lymphovascular tissue, and interstitial fat. The patterns were consistent across gender and reproducible across subjects.

Conclusions: Fluorescence lifetime imaging (FLIm) was successfully adapted to GI tissue, defining the spectral and lifetime properties in a healthy animal model. With the feasibility proven in the GI tract, next steps will be determining the sensitivity of FLIm in colorectal disease states and human validation as an intraoperative guidance tool during colorectal surgery.

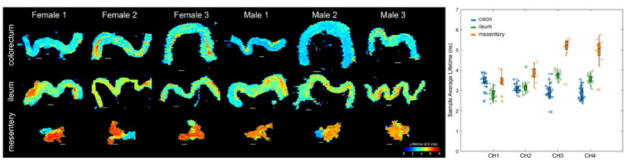

Figure: Lifetime maps in channel 3 (ch3, FAD target) of colorectum, ileum, and mesentery from 6 representative mice, and the average lifetimes obtained per each sample in each channel.

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A Phase 2 Randomized Open-label Dose-Ranging Study for Ureter Visualization, Using Pudexacianinium Chloride (ASP5354) in Subjects Undergoing Minimally Invasive Colorectal Surgery

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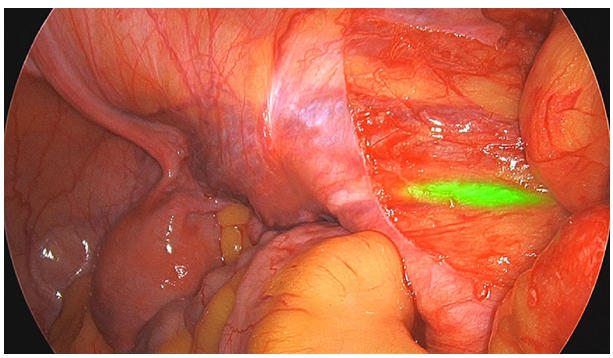
Introduction: Pudexacianinium chloride (ASP5354) is an indocyanine-green derivative with hydrophilic properties and rapid urinary clearance without metabolism after intravenous administration, thereby enabling accurate ureter visualization. The primary objective of this phase 2 study was to determine the optimal dose for ureter visualization after intravenous administration in subjects undergoing minimally invasive colorectal surgery. Safety/tolerability and pharmacokinetics of pudexacianinium were secondary objectives. Clinical benefit of ureter visualization was an exploratory endpoint. Real-time intraoperative ureter visualization has been reported to minimize iatrogenic ureteral injury (IUI), a rare but serious complication. There is an unmet need for an effective, noninvasive, and safe modality for intraoperative ureter visualization. The current visualization alternative (prophylactic stenting) is invasive, time consuming, and has insufficient evidence of efficacy in reducing IUI.

Methods: Adult subjects undergoing minimally invasive colorectal surgery in which ureter visualization was required were randomized to receive a single intravenous dose of 0.3-, 1.0-, or 3.0-mg pudexacianinium chloride following placement of a laparoscopic NIR-F imaging device above the ureter of interest. Nonclinical studies of ureter visualization and phase 1 pharmacokinetic data supported the three dose levels evaluated. Ureter fluorescence visualization was assessed 10, 20, 30, 45, and 60 min after administration, then every 30 min through end-of-surgery. The key time points for successful ureter visualization were 30 min post-dosing and end-of-surgery. Assessments were performed using a binary "Yes/No" question on the ability to visualize the index ureter and contralateral ureter, when feasible. Data were summarized with descriptive statistics by dose group. A Visualization Review Committee reviewed ureter visualization and safety data for optimal dose selection.

Results: Nine subjects (n = 3 per dose) were treated, seven were female, median age was 53 years (range 24–69), and mean body mass index was 27.6 kg/m^2 (range 18.7–38.1). Ureter visualization was observed at 30 min post-dosing in all participants (**Figure**) and through end-of-surgery in all but one participant in the 0.3-mg cohort. Notable differences in ureter visualization between the 1.0- and 3.0-mg dose were not observed. There were no pudexacianinium-related treatment-emergent adverse or serious adverse events, nor any deaths. Estimated total plasma exposure (AUC_{inf}) of pudexacianinium was dose proportional. Continuous fluorescent ureter visualization during the entire procedure was assessed as a significant clinical benefit by study surgeons.

Conclusions: Pudexacianinium was well tolerated and demonstrated ureter visualization during the entire surgical procedure. 1.0-mg pudexacianinium was selected as the optimal dose for ureter visualization.

Figure Pudexacianinium-mediated enhanced ureter visualization.



P333

Usefulness of V-Loc Hand-Sewn Anastomosis in Gastrointestinal Surgery

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Introduction: In gastrointestinal surgery, the integrity of intestinal anastomosis is important, as anastomotic leakage may occasionally be fatal. Different techniques of GI anastomosis are used including Stapled anastomosis and hand-sewn technique; stapled anastomosis being the most used technique currently. V-Loc is a new device for wound closure, and consists of a unidirectional barbed absorbable thread. It has multiple benefits, including high tissue adhesion ability, as they attach to tissue at numerous points. Moreover, the loop-end design avoids the need for tying a surgical knot. The V-Loc technique has been studied in gynecology and urology cases. To the best of our knowledge there is no specific study comparing the anastomotic leak between the stables or V-Loc in the GI anastomosis. However, there is a single study was done in 20 recently deceased individuals comparing the use of the V-Loc and the monofilament suture material.

Objectives: To compare the gastrointestinal anastomotic leak rate between regular stapler or stitch (PDS) and the Barbed (V-Loc 180) stitch.

Method: This was a retrospective review of 102 patient medical records. We included all patients older than 18, who underwent gastrointestinal anastomosis either using staples, regular stitches or V-Loc stitch. We collected data from 2016 to 2020 of a single surgeon experience. We used IBM SPSS for data analysis.

Result: Among 102 patient who underwent gastrointestinal anastomosis, stapler was used in 71% of the cases. V loc was used most in small bowel and colorectal anastomosis. Staples more utilized in open cases. While V loc was more utilized in the robotic cases. That explain our finding of less hospital stay in the V loc group (P value 0.004). 56 anastomoses were done in emergent cases, out of that we used V loc in 5 anastomoses with 1 leak vs 6 leaks in stapler group with P value 0.5. The leak rate was 11.1% in staple group compare to 10% in the V loc group with P value of 0.58.

Conclusion: V-loc suture is safe to use in gastroinestinal anastamosis. There is no difference in leak rate in gastrointestinal anastomosis between the standard method of stapler vs V loc stitch. Also, we found it is safe to use the V loc stitch in the emergency cases.

P334

Hydrodissection Use in Laparoscopic Gangrenous Cholecystectomy: Effect on Need to Convert to Open Surgery and Time Required for Recovery

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Introduction: Gangrenous cholecystectomy (GC) represents a complicated case of laparoscopic cholecystectomies where inflammation and other tissues obstruct the critical view (i.e., cystic artery and duct). Poor visualization with standard blunt dissection, can lead to surgical complications such as bleeding or bile duct injury, resulting in the need to convert from a laparoscopic to an open procedure. However, the use of hydrodissection, normal saline jetstreams that clear purulent and necrotic debris, during laparoscopic GCs can better reveal the critical view and localize critical structures. In this retrospective study, we analyze the impact of hydrodissection on key surgical parameters: conversion from laparoscopy to open surgery, postoperative length of stay (LOS), and frequency of 30-day readmissions.

Method: After IRB approval, 386 laparoscopic cholecystectomy cases performed between 2018 and 2020, were analyzed in a retrospective study. Experimental data was collected for patient demographics, medical comorbidities, surgical outcomes, complications, and operating time. Subjects were categorized into four groups: (1) surgeon A employing the HD technique for GC (AHGC), (2) group B comprised of 5 surgeons not employing the HD technique for GC (BNHGC), (3) surgeon A performing non-GC (AC), and (4) group B performing non-GC (BC). There were 14 cases of GCs in the AHGC group and 10 cases of GCs in the BNHGC group. The ASA score, BMI, and age were used to select AC and BC control group subjects. Using Chi-square and paired t-testing, we evaluated the rate of conversion to open surgery, 30-day readmission rates, and postoperative LOS.

Results: Chi-square testing demonstrated statistically significant ($p < 0.05$) differences in conversion to open surgery between the BNHGC group and the remaining three groups. There were two conversions in the BNHGC group, and none in the other three groups.

Postoperative LOS was calculated for all groups (mean $\pm$ SE): AHGC (0.71 ± 0.244), BNHGC (2.30 ± 0.423), AC (0.64 ± 0.289), and BC (2.10 ± 1.15). Paired t-testing demonstrated a statistically significant decrease ($p < 0.05$) in postoperative stay for the AHGC group when compared to the BNHGC group.

One subject in the AHGC and one subject in the BNHGC group were readmitted to the hospital within 30 days post-operation. Chi-square analysis revealed no statistical significance between these groups.

Conclusion: Hydrodissection during laparoscopic GCs may be more efficacious when compared to traditional blunt dissection due to improved visualization of the critical structures, resulting in fewer iatrogenic complications and less time required for recovery.

P335

The Evolving Surgical Management of Moderate to Severe Cholecystitis

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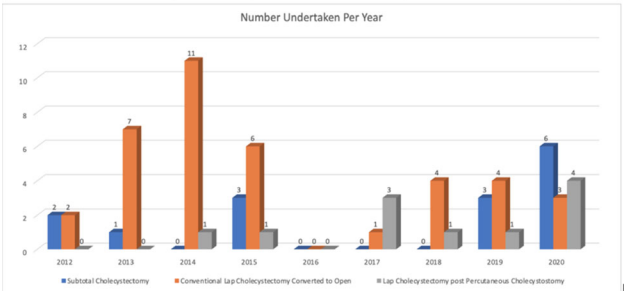
Introduction: This study was undertaken to examine the management of patients with moderate to severe cholecystitis at our safety net hospital.

	Subtotal Cholecystectomy	Conventional Lap Cholecystectomy Converted to Open	Lap Cholecystectomy post Percutaneous Cholecystostomy	Across all 3 groups
	18	35	11	Total / p-Value
Demographics				
Age (years)	56(55 ± 17.9)	66(63 ± 13.6)	75(75 ± 14.3)	**0.009**
Gender (Man/Woman)	56%M / 44% W	49%M / 51%W	45%M / 55% W	NS
BMI (kg/m2)	33(32 ± 0.73)	31(31 ± 8.3)	29(29 ± 7.9)	0.04
Previous Intra-abdominal Surgery	33%	60%	64%	NS
Preoperative Total Bilirubin	0.7 (0.4 ± 0.54)	0.75 (1.8 ± 3.5)	0.6(0.8 ± 0.93)	NS
Preoperative WBC	10.9 (13.7 ± 1.54)	9 (10 ± 6.3)	6.2(7.2 ± 3.09)	**0.04**
ASA Classification	2(2 ± 0.63)	3 (3 ± 0.73)	3(3 ± 0.53)	**0.007**
Intraoperative Course				
Years of Experience	1 – 5 (33%) 5 – 6 (44 %) >10 (23%)	1 – 5 (40%) 5 – 6 (10 %) >10 (50%)	1 – 5 (46%) 5 – 6 (27 %) >10 (27%)	0.03
Operative Duration (mins)	147 (152 ± 4.0)	179(220 ± 199.8)	91(134 ± 81.3)	NS
Estimated Blood Loss (mL)	100 (262 ± 114.6)	**300(361 ± 341.1)**	40(118 ± 229.9)	0.07
Intra-Operative Cholangiogram	22%	14%	18%	NS
Conversions to open	50%	100%	18%	**<0.0001**
Intra-Operative Complications	44%	**83%**	45%	**0.006**
Drain Placement	61%	29%	27%	**0.05**
Postoperative Course				
Length of Stay (days) [operation - discharge]	6(7 ± 4.6)	5(7 ± 5.4)	2(4 ± 5.2)	NS
Total Length of Stay (days) [admission - discharge]	10(11 ± 7.4)	9(10 ± 8.5)	4(6 ± 7.2)	NS
ICU Length of Stay (day)	0(1 ± 0.58)	0 (1 ± 3.4)	0(1 ± 1.5)	NS
Discharge with Drain	39%	17%	0%	NS
Postoperative Complications	27%	17%	9%	NS
In-hospital Mortality	0%	3%	0%	NS
Readmission within 90 Days	7%	9%	0%	NS
30 Day Mortality	0%	3%	0%	NS



Methods: From December 2012-to-December 2020, 2,541 patients underwent cholecystectomy and 71 patients underwent percutaneous cholecystostomy tube (PC). With IRB approval, demographic data and perioperative outcomes were analyzed and compared between patients undergoing laparoscopic cholecystectomy that were converted to 'open', subtotal cholecystectomies (SC), and interval cholecystectomy (IC) status post PC tube placement. Statistical analysis was undertaken utilizing GraphPad Prism 9^{TM} software. Nominal data were analyzed using Chi-Square Analysis. Interval data were analyzed utilizing non-parametric testing of means through Mann–Whitney U-Test. For illustrative purposes, data are presented as median (mean ± SD).

Results: Of all patients undergoing cholecystectomy from 2012—2020, 35 (1.4%) underwent 'conversion to open', 18 (< 1%) underwent subtotal cholecystectomy. Of the 71-patient that underwent percutaneous cholecystostomy, 11 (16%) underwent subsequent cholecystectomy.

Patients who underwent SC and 'conversion to open' were significantly younger and had a lower ASA class, compared to those who underwent PC/ ICp = 0.005, p = 0.007, respectively. There was no difference in operative duration or use of intraoperative cholangiogram (IOC), between all three groups (Table). Median Estimated blood loss (EBL) was 300 ml in patients that were 'converted to open' vs. 100 ml and 40 ml in patients undergoing subtotal and PC/IC, p = 0.07. Of patients undergoing SC, 28% underwent ERCP postoperatively.

MIS Surgeons undertook more subtotal laparoscopic cholecystectomy than ACS surgeons 56% vs. 44%; ACS surgeons were more likely to convert to open compared to MIS surgeons 77% vs. 33%, p = 0.02. Majority of SC were undertaken by Surgeons that were less than 10 years from finishing fellowship training, regardless of the training type, p = 0.03. Over time, there was a trend towards increased number of SC and a decrease in the number of laparoscopic to open conversions (Table).

Conclusions: The management of patients with moderate to severe cholecystitis continues to evolve. Laparoscopic subtotal cholecystectomy is a safe and feasible option for the management of a difficult gallbladder with less intraoperative complications and trends toward a decrease in EBL, and in readmission rates. At our institution the last decade has seen a trend towards increased utilization of SC and decrease in laparoscopic cholecystectomies being converted to open, which is led by the younger surgeons.

P336

Robotic Hysterectomy in Obese Cancer Patients with Concomitant Abdominoplasty

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Introduction: As obesity has increased in prevalence in the United States, the incidence of endometrial carcinoma has also risen. Optimal management of these patients includes minimally invasive hysterectomy. There are technical challenges directly related to obesity. Concomitant abdominoplasty allows for the removal of excess adipose tissue obstructing surgical access and allows for easy port placement, thus facilitating the procedure.

Methods and Procedures: Between the dates of January 2018 and December 2020, 13 patients with a known diagnosis of endometrial carcinoma, a BMI of greater than 35, and asymmetric lipodystrophy underwent a concomitant abdominoplasty with a robotic hysterectomy. Outcomes and complications were determined through retrospective evaluation of patient charts and these values were compared to national averages as determined by a literature review on robotic hysterectomy. The postoperative aesthetic appearance of the abdominal wall was also noted on follow-up clinic visits and showed no clinical differences in results. Subjective surgeon satisfaction was also noted postoperatively. The same plastic surgeon and gynecological oncology specialist performed all the procedures.

Results: Thirteen patients met inclusion criteria and revealed no overall increase in complication rates. Infection rates, wound dehiscence, as well as time to drain removal all showed no statistically significant difference while also subjectively proving to be a simpler procedure in terms of gaining access to the patient's anatomical landmarks and performing the robotic hysterectomy. There was also a decrease on average of total time spent operating when compared to the procedures being performed independently.

Conclusion(s): Concomitant robotic hysterectomy and abdominoplasty allow for the removal of the excess adipose tissue obstructing the surgeons' access. We demonstrate that this is helpful in robotic hysterectomy for endometrial carcinoma. This technique may be of benefit for other robotic operations in morbidly obese patients. While there have been studies showing the benefits of simultaneous abdominoplasty with open abdominal surgery, there is no specific research elucidating the impact that a concomitant abdominoplasty has on a robotic procedure. Future research comparing complications, objective surgical success, and objective indications for the combined procedure needs to be performed on a larger patient population.

P337

Construction of a multicenter database of endoscopic surgery for supporting the Information-powered surgery

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In recent years, surgeries have become increasingly minimally invasive, which has required surgeons to learn more advanced techniques, while the number of surgeons has remained in short supply. As a result, each doctor must handle an increased workload while ensuring the quality of medical care. As a way to solve this problem, we have started to construct a surgical database. By collecting surgical videos and building a database that combines surgeon information and clinical data, we can accelerate the development of fields such as surgical education, data analysis research, and the development of new medical devices. This is because it will enable surgeons to learn surgical techniques efficiently.

We are building a large-scale video database of endoscopic surgeries by collecting surgical and urological surgical information from about 90 facilities across Japan, funded by the Japan Agency for Medical Research and Development (AMED) starting in 2019. This project is called "S-access JAPAN". And from 2020, we have started a project to build a database in gynecology called "Gyne-storage". With it, a surgical video database of about 4,500 cases of 20 different surgeries including gastrointestinal surgeries such as colorectal resection, gastrectomy, hepatectomy, pancreatectomy, and cholecystectomy, gynecological surgeries such as total hysterectomy and myomectomy, and urological surgeries of prostatectomy was constructed. It includes not only laparoscopic surgery but also robotic surgery. In addition, not only "surgical videos" but also "surgical data" such as operation time and blood loss, "clinical data" such as the size of the myoma, "surgeon profiles" such as years of experience and whether the surgeon is technically certified, and "medical image data" such as preoperative MRI were collected. In order to make the database more value-added, we annotated information such as the surgical process and surgical devices in each operation.

This database can be shared with various sectors such as universities, research institutes, academic societies, research groups, and medical device development companies. We have built an infrastructure for creating products for the world as an all-Japan team.

P338

A Head-to-Head Comparison of Increased Degrees-of-Freedom (IDOF) Laparoscopic Instruments for Complex Angle Intracorporeal Suturing

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Introduction: Robotic surgical platforms have been steadily gaining traction for general surgical procedures. One of the primary values many surgeons see in these devices is the added degrees of freedom their end-effectors provide. Particularly attractive, is leveraging these added capabilities to enable suturing at awkward angles such as in anastomoses or abdominal wall reconstruction where standard laparoscopic instruments founder. A plethora of new instruments and platforms that attempt to mimic the wristed action of the robotic platform have recently emerged.

Using a number of objective and subjective metrics, we endeavored to compare the suturing capabilities and learning curve of a number of these novel, increased-degree-of-freedom (IDOF) devices including the Artisential (AL), FlexDex (FD), and HandX (HX) instruments. To provide a baseline for comparison, we collected the same data using "straight stick" standard laparoscopic instruments (SL), and the DaVinci (DV) platform. To our knowledge this is the first head-to-head comparison between these five technologies.

Methods: Surgeons with differing level of expertise were asked to participate. The tasks chosen involved suturing at sites of varying degrees of angulation from 0 – 270°. All participants received training on each instrument as recommended by the manufacturer. Data collected included task accuracy, time to complete each task, completion of a NASA-Task Load Index (NASA-TLX) evaluation and completion of a subjective questionnaire.

Results: Time to completion and accuracy, correlated well with the subjective parameters. DV was best overall for all parameters and was significantly better than all of the IDOF instruments and SL. Junior level subjects struggled to complete many of the tasks even with the added capabilities of the IDOF instruments and their scores were not significantly better than what they achieved with SL. Amongst the senior level subjects, FD fared consistently better than SL especially for the tasks with the highest level of complexity.

Conclusion: DV still remains the best overall IDOF system for complex suturing tasks but is also by far the most expensive and has the largest footprint of all of the instruments we studied. Of the novel singular IDOF instruments we evaluated, FD had the shortest learning curve, added the least overall work-load demand on the surgeon and augmented the capabilities of the experienced surgeons.

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Outcomes of Surgical Pancreatic Necrosectomy in Non-Obese versus Obese

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Introduction: Acute necrotizing pancreatitis is associated with high morbidity and mortality. Obesity may impact surgical outcomes due to the associated systemic proinflammatory state. This study aims to compare surgical necrosectomy outcomes between non-obese and obese subjects.

Methods: A retrospective chart review was performed for all patients who underwent surgical necrosectomy with minimally invasive approach (MIA) or open approach (OA), over a ten year period. Patients were divided into two groups: obese (BMI $\geq$ 30 kg/m2) and non-obese (BMI $<$ 30 kg/m2). The primary endpoint was the incidence of any early complications or postoperative death. The secondary endpoint was the incidence of any long term complication.

Results: 25 patients (MIA:15; OA:10) were included with 13 (52%) non-obese, and 12 (48%) obese. The average age was 56.60 $\pm$ 17.01 years, with male (56%, n = 14) and caucasian (76%, n = 19) predominance. The median follow-up time was 3.5 months (IQR: 1.06 -17.33 months). Preoperative variables were comparable between groups except for the CT-severity index and the extension of the pancreatic necrosis, which were higher for the obese subjects (p = 0.009 and 0.023, respectively). Operative time, excess blood loss, and length of stay were similar between the groups. The incidence of pancreatic fistula was higher in obese subjects (41.7% vs. 0%, p = 0.015).

Conclusions: Surgical necrosectomy appears to be safe and effective regardless of the patient BMI. Operative outcomes of obese subjects undergoing pancreatic necrosectomy seem to be comparable to non-obese patients, except for an increased incidence of pancreatic fistula. Further prospective studies are needed to better understand this findings.

Table 1. Preoperative and intraoperative variables.

	Subjects with Obesity N=12 N (%) or mean±SD	Subjects without Obesity N=13 N (%) or mean±SD	P value
Age	46.50±15.577	65.92±12.672	0.002[c]
Gender			0.561[a]
Female	6 (50.0)	5 (38.5)	
Male	6 (50.0)	8 (61.5)	
Race/Ethnicity			0.729[a]
White caucasian	9 (75.0)	10 (76.9)	
Black	1 (8.3)	1 (7.7)	
Hispanic	1 (8.3)	2 (15.4)	
Other	1 (8.3)	0 (0)	
Cardiovascular disease	4 (33.3)	5 (38.5)	1.000[b]
Respiratory disease	2 (16.7)	0 (0)	0.220[b]
Kidney disease	1 (8.3)	1 (7.7)	1.000[b]
Diabetes mellitus	6 (50.0)	3 (23.1)	0.226[b]
Cause of pancreatitis			0.671[a]
Gallstones	6 (50.0)	4 (30.8)	
Alcohol	2 (16.7)	2 (15.4)	
Hypertriglyceridemia	0 (0)	0 (0)	
Post ERCP	2 (16.7)	5 (38.5)	
Other	2 (16.7)	2 (15.4)	
CRP (mg/dL)	91.02±125.56	84.37±102.71	0.740[c]
WBC (10^3/uL)	16.05±6.29	14.56±4.08	0.495[c]
SOFA	2.50 ±2.588	3.13 ±.855	0.282[c]
Rausen			
Admission	2.40 ±1.817	1.33 ±.577	0.856[c]
Cumulative	4.20 ±2.168	4.00 ±.816	0.440[c]
Single organ failure	4 (33.3)	6 (46.2)	0.513[a]
Multiple organ failure	3 (25.0)	1 (7.7)	0.322[a]
Nutritional support	8 (66.7)	11 (84.6)	0.378[a]
CT severity index	2.75±0.82	1.24±0.35	0.009[c]
Pancreatic necrosis extending more than 50%	5 (41.7)	0 (0)	0.023
Gas configuration within pancreatic necrosis	9 (75.0)	7 (53.8)	0.353[a]
Type of procedure			0.410[a]
Open	3 (25.0)	7 (53.8)	
Laparoscopic	4 (33.3)	4 (30.8)	
VARD	5 (41.7)	2 (15.4)	
Excess blood loss (mL)	83.18±142.21	210.00±342.67	0.169[c]
Operative time (min)	122.73±52.41	117.91±49.41	0.827[c]
Days in hospital	22.42±8.30	23.46±13.10	1.000[c]

N=Number. Mean ± Standard deviation or (%) Percentage. ERCP= Endoscopic Retrograde Cholangiopancreatography, CRP= C reactive Protein, WBC= White Blood Cell Count, SOFA= Sequential Organ Failure Assessment, VARD= Video assisted Retroperitoneal Debridement. a=Unpaired T test, b= Chi Square Test, c=Mann-Whitney U test. Statistical significance of 0.05 (α) was established for analysis.

Table 2. Early complications and long term complications.

	Subjects with Obesity N=12 N (%) or mean±SD	Subjects without Obesity N=13 N (%) or mean±SD	P value
Early complications			
Any early complication	9 (75%)	5 (38.5%)	0.066[b]
New onset MOF	0 (0)	1 (7.7%)	1.000[b]
New onset single organ failure	1 (8.3)	2 (15.4)	1.000[b]
Intraabdominal bleeding requiring intervention	0 (0)	1 (7.7)	1.000[b]
Enterocutaneous fistula or perforation of a visceral organ requiring intervention	0 (0)	3 (23.1)	0.220[b]
Pancreatic fistula	5 (41.7)	0 (0)	0.015[b]
Death	0 (0)	2 (15.4)	0.480[b]
Long term complications			
Biliary stricture	1 (8.3)	3 (23.1)	0.593[b]
New onset diabetes mellitus	3 (25.0)	5 (38.5)	0.673[b]
New onset chronic pancreatitis	5 (41.7)	3 (23.1)	0.411[b]

N=Number. Mean ± Standard deviation or (%) Percentage. MOF= Multiple Organ Failure. a=Unpaired T test, b= Chi Square Test, c=Mann-Whitney U test. Statistical significance of 0.05 (α) was established for analysis.

P344

Spyglass pre-oral pancreatoscopy and lithotripsy in patients with calcific chronic pancreatitis-associated abdominal pain. A case series

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Chronic pancreatitis is a condition characterized by fibrosis, scaring, ductal strictures, and calcifications of the pancreas due to a recurrent inflammation process. Patients with obstructive pancreatic ductal stones may develop ductal hypertension and chronic abdominal pain not easily managed with medical therapy. During the past decades, endoscopic, percutaneous, and surgical procedures have shown efficacy in the treatment of chronic abdominal pain due to ductal stones.

Pre-oral pancreatoscopy-guided (POP) lithotripsy is a novel therapy were direct stone visualization aids electrohydraulic (EHL) or laser lithotripsy (LL) during a ERCP procedure. Although scarce information has been reported, recent studies describe successful duct clearance between 43%–100%, clinical success in 90%, and an adverse events between 0%–13.5%.

We describe our experience with POP lithotripsy in three patients with calcific chronic pancreatitis (CCP) and chronic abdominal pain at our center in Monterrey, Mexico, were Spyglass pancreatoscopy has been recently implemented.

16-, 31- and 45-year-old males with idiopathic CCP, two of them with previous hospitalizations for intense abdominal pain (10/10 in Likert scale), pain management with non-steroid anti-inflammatory drugs (NSAIDS) and one patient with previous endoscopic retrograde cholangiopancreatography (ERCP) and ductal stent placement. Two of them managed with ERCP and Spyglass POP-LL Holmium equipment and one with ERCP and POP-EHL and stone retrieval with Spyglass basket. Multiple stones found at the head of the pancreas with complete duct clearance in two patients after a mean of 165 min of procedure. One of them requiring a second session with complete clearance afterwards. Two of them without new hospitalizations due to abdominal pain. One patient with a 24-h hospitalization after discharge due to abdominal pain treated with NSADIS after POP-EHL with no hospitalizations afterwards. All three patients with complete resolution of symptoms. No adverse events found after 6 – 24 month follow up.

POP-guided lithotripsy has been implemented as safe and effective therapeutic option for CCP-related abdominal pain in other medical centers. At our institution, three cases have been treated with Spyglass POP-guided lithotripsy equipment with acceptable efficacy as in 100% duct clearance and clinical resolution of symptoms with no adverse events.

P345

Practice Patterns of Pancreatic Surgery Within the Military

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Objectives: The purpose of this study is to evaluate and describe the patterns in pancreatic surgeries performed at military hospitals. Pancreatic surgery is amongst the most technically challenging areas of surgical expertise, with mortality rates at high volume centers ranging from 0–5%. Select data demonstrates an inverse relationship between surgeon volume and perioperative mortality, which suggests that patients may benefit from undergoing pancreatic surgery by experienced surgeons at high volume centers. There is little published on the volume of pancreas surgeries performed in military facilities. There is no specific centralization policy within the military. This study evaluates the numbers and types of pancreatic procedures performed at military hospitals. We hypothesized that a small group of military treatment facilities perform the majority of procedures and will perform more complex pancreatic surgeries. This data aims to examine practice patterns within military treatment facilities with respect to pancreatic procedures.

Methods: This study is a retrospective review of de-identified data from MHS Mart (M2) from 2013 to 2020. The M2 database contains patient data from all Defense Health Agency (DHA) treatment facilities, which includes all branches of the United States Military. Variables collected include number and types of pancreatic procedures performed, patient demographics, complications and mortality rate. The primary endpoint evaluated was volume and type of surgery for each medical facility.

Results: Twenty-six military hospitals performed pancreatic surgeries from 2013 to 2020. A total of 365 pancreatic surgeries were performed during this time. There was a statistically significant decrease in the number of cases from 2014 to 2020. There were no high-volume centers (> 21 cases), 1 medium-volume center (10–20 cases), and 25 low-volume centers (< 9 cases). There were 9 hospitals that performed only 1 pancreatic surgery over 8 years. The most commonly performed surgery was a distal pancreatectomy, followed by a pancreaticoduodenectomy. There was a slight decrease in the number of pancreaticoduodenectomies and distal pancreatectomies performed over this period; however, this difference was not statistically significant.

Conclusions: Pancreatic surgery is performed predominately by a few military centers. Over time, less pancreatic surgery is being performed at military treatment facilities.

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Pancreatic Adenosquamous Carcinoma

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Background: Adenosquamous carcinoma (ASC) of the pancreas is a rare form of pancreatic cancer with a worse prognosis than pancreatic adenocarcinoma. We report our case series in an integrated health care system.

Methods: An institutional review board approved review of all pancreatic cancer. A total of 4,340 pancreatic cancer patients were identified between February 2010 and December 2018. Of those, 3,799 were diagnosed with pancreatic adenocarcinoma, we identified 23 patients with pancreatic ASC.

Results: Patients with ASC had a median age of 67 years old without a gender bias at presentation. The tumor was in the tail of the pancreas in 44% of cases and head in 30%. Median overall survival was 8 months. Mean size of the tumor was 5 cm. Surgery was the initial treatment in 13 patients (57%) with a 39% negative surgical margin. Lymph nodes were positive in 54% of those underwent surgical resection. Neurovascular invasion was identified in 100%, with a 62% also showing lymphovascular invasion. A total of 7 patient received adjuvant chemotherapy after surgery, while 4 patients received adjuvant chemotherapy and radiation. Median survival for multimodality treatment was 57 months. Median survival for patient with negative pathologic margins were 65 months. One patient is currently receiving neoadjuvant chemotherapy and radiation (6 month into treatment without any evidence of metastatic disease).

Conclusions: Adenosquamous carcinoma of the pancreas is extremely aggressive with a poor prognosis. The higher positive surgical margins and larger size argue for selective downstaging of the primary tumor. Neoadjuvant chemoradiation is an encouraging strategy for the treatment of ASC being inferred from ongoing clinical trials for neoadjuvant chemotherapy for pancreatic duct adenocarcinoma.

P347

Laparoscopic cyst-gastrostomy anastomosis for pancreatic pseudocyst: Experience in a third level reference hospital at Mexico City

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Pancreatic fluid collections are local complications of acute pancreatitis. They can evolve to walled-off pancreatic necrosis (WON), acute necrosis collection, and pancreatic pseudocyst. [1]

These are a rare phenomenon that can occur in 20% of cases of acute pancreatitis and 40% in chronic pancreatitis. [1]

Its incidence is 90% of all pancreatic cyst lesions. [2]

Management has been classified as surgical (open and laparoscopic) and non-surgical (endoscopic and radiologic). [3]

The objective of this study is to describe the morbidity, mortality, and efficacy of the laparoscopic surgical approach in the treatment of patients with pancreatic pseudocyst in our experience as a third level hospital reference.

This is a retrospective, descriptive and observational study that was developed between February 2016 and October 2019.

We included 25 patients with pancreatic pseudocyst treated with laparoscopic surgery.

Results: The total sample was 25 patients with a pancreatic pseudocyst, of which, 72% was secondary to biliary pancreatitis, 16% by alcoholic pancreatitis, and 12% by dyslipidemia. The size of the cyst with an average diameter of 16 cm and a volume of 300 ml.

In 100% of the patients the surgery performed was laparoscopic cyst-gastrostomy anastomosis with endogastric approach, with a media of surgical time of 115 min, postoperative period with an average of 4 days at hospital. Complications were reported in 4% and only one patient required reoperation where anastomotic leakage was documented.

The maximum follow-up was for 36 months, there were no complications, and it was evaluated with a recurrence rate of 0%.

Mortality from this case series was 4% due to abdominal sepsis.

Conclusions: The laparoscopic technique used in this hospital report that this approach is effectiveness and a safe option treatment that reflects low mortality and morbidity, performed by skilled surgeons. Is well known that an acceptable treatment is endoscopic management as a first line role in certain situations because is associated with fewer adverse events and shorter hospital stays, nevertheless the role of endoscopy as a specialized management is not available in all hospital, so the laparoscopic approach continues to be a safe option.

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Hand-Assisted Versus Pure Laparoscopic Distal Pancreatectomy: Is There a Downside to Lending a Hand?

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Introduction: Hand-assisted technique for laparoscopic distal pancreatectomy (HALDP) has been suggested to improve tactile sensation and tissue dissection with shorter operative times as compared to purely laparoscopic distal pancreatectomy (PLDP). Although the location and size of the hand-port or extraction incisions differ between HALDP and PLDP, it remains unclear whether operative time or development of post-operative incisional hernias at the extraction site differs between the two techniques.

Methods: This is a retrospective review of all patients undergoing HALDP or PLDP at a single academic medical center from 2012 to 2020. Primary endpoints were operative time and development of postoperative incisional hernia. All patients had a minimum follow-up of six months. Unadjusted and multivariate logistic regression were used to compare outcomes.

Results: Among 109 patients identified, 55% underwent HALDP and 45% PLDP. Age (median, 65 vs. 60 years; $p = 0.23$), sex (female 48.3% vs. 48.9%; $p = 1.0$), race (white 66.6% vs. 63.2%; $p = 0.35$), and BMI (median, 26.6 vs. 25.4; $p = 0.32$) were similar between patients undergoing HALDP and PLDP. Receipt of neoadjuvant chemotherapy was similar between groups (18.3% vs. 11.6%; $p = 0.42$). Patients undergoing HALDP had more soft glands (65% vs. 38.7%; $p = 0.03$). Length of stay (median, 6 vs. 5 days; $p = 0.75$), operative time (243 vs. 246 min; $p = 0.68$) and superficial wound infection rates (15% vs. 14.2%; $p = 1$) were similar between HALDP and PLDP groups. The incidence of postoperative incisional hernia was significantly higher in the HALDP vs. PLDP group (30% vs. 8%; $p = 0.018$). In the multivariable model, HALDP vs. PLDP was associated with increased odds of incisional hernia development (OR 4.14; $p = 0.03$).

Conclusions: In comparison with PLDP, HALDP was associated with an increased odds of developing postoperative incisional hernia and similar operative times. Our findings suggest the need for further research into identifying which cases may benefit more from the HALDP technique and careful consideration of patient risk factors when determining whether HALDP is the optimal approach.

P349

Minimally Invasive Approach Utilizing Cystoscope for Debridement In Necrotizing Pancreatitis: A Case Report

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Introduction: Necrotizing pancreatitis(NP) is challenging due to the high morbidity and mortality rates(30–39%). Historically, management includes open necrosectomy and debridement(OND), and later recognized to have higher complications rates compared to minimally invasive surgical(MIS) approaches. This case presentation describes a safe and effective method to laparoscopic video-assisted retroperitoneal debridement(VARD) after failure of percutaneous catheter drainage.

Case Description: 42-year-old male with alcohol-induced pancreatitis was admitted to the ICU with surgical consultation for NP. The step-up approach was initiated with interventional radiology percutaneously placing retroperitoneal drains. Unfortunately, interval CTs revealed persistent peripancreatic collections refractory to additional drains necessitating escalation to VARD. Our modified technique was executed utilizing guidewires under fluoroscopy to access the collections through the pre-existing drains. Using Seldinger's technique, nephrostomy dilators were introduced to serially upsize the drain sites and non-bladed trocars were introduced to accommodate 5&10-mm versaports. A cystoscope (Fig. 1) with additional instrument port and continuous saline irrigation was inserted into the 10-mm port. Continuous negative-pressure suction was created via tubing connected to the insufflation channel on the 5-mm port. Necrotic tissue was debrided using laparoscopic bowel grasper through the available instrument port, irrigated, and removed. Black necrotic tissue was debrided until pink healthy mucosa was apparent, signifying effective debridement. The ports were replaced with drains using Seldinger's technique. Ultimately, the patient did not require OND.

Discussion: NP with intra-abdominal collections refractory to percutaneous drainage is an indication for necrosectomy. MIS debridement has proven to be effective and less morbid than OND. In comparison to other MIS techniques, this case is notable for being extensively MIS-driven with smaller incisions being utilized. In retrospect, a single-port multichannel device could have been implicated for an even less invasive access, however, would have lacked the continuous irrigation inflow with negative-pressure outflow that our method described. Limitations to our method include difficulty in accessing dependent collections in certain prone positions. An interdisciplinary course including IR may optimize adequacy of drainage to avoid multiple operative trips. Additionally, VARD should be avoided in collections adjacent to structures such as the duodenum or stomach to avoid damage; these collections are more likely to benefit from transgastric drainage. Similarly, to any MIS procedures, VARD is disadvantageous in the event of hemorrhage, which may require conversion to open. Because NP necessitating surgical intervention is rare, our future work includes creating live-tissue animal models for educational simulation with the objective of training surgeons to perform this technique safely, comfortably, and confidently.

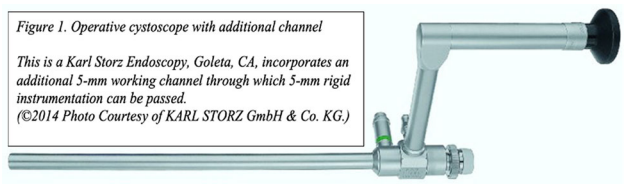
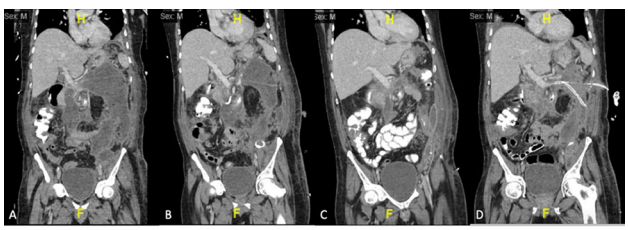
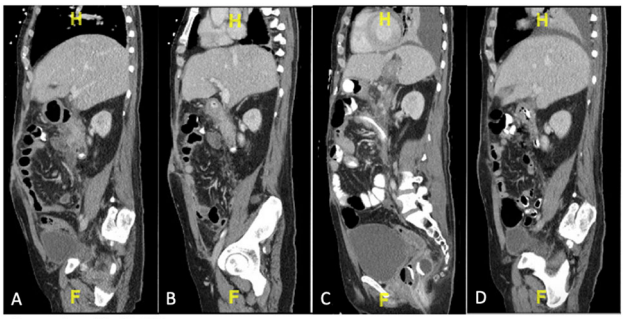


Figure 1. Operative cystoscope with additional channel

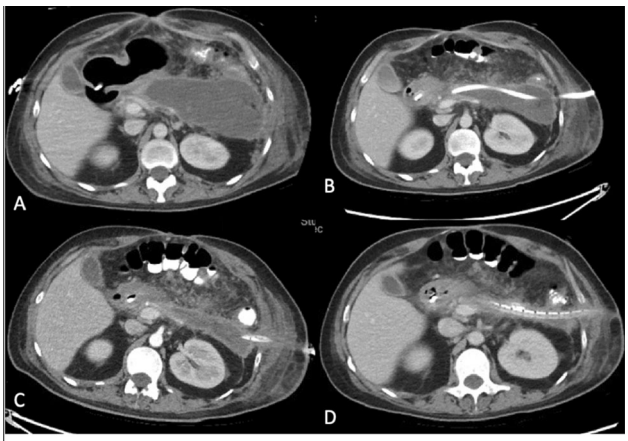
This is a Karl Storz Endoscopy, Goleta, CA, incorporates an additional 5-mm working channel through which 5-mm rigid instrumentation can be passed.
(©2014 Photo Courtesy of KARL STORZ GmbH & Co. KG.)



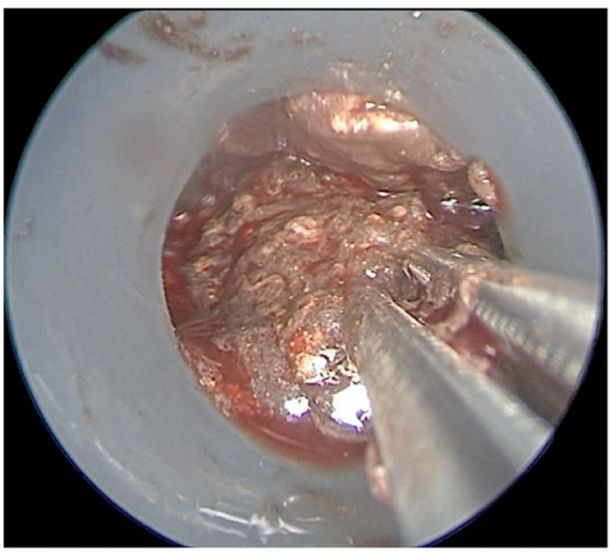
Progression of Coronal View
A) Before IR drainage B) Post IR drainage C) VARD D) Post VARD



Progression of Sagittal View
A) Before IR drainage B) Post IR drainage C) VARD D) Post VARD



Progression of Axial View
A) Before IR drainage B) Post IR drainage
C) VARD D) Post VARD



Gross necrotic debris in situ

P350

Impact of Medicare Accountable Care Penetration on the Use of Robotic Surgery in New York State

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Introduction: Accountable care organizations (ACOs) were introduced by the 2010 Affordable Care Act to improve population health and quality of care and reduce utilization of low value services by introducing alternative value-based payment models. Concurrently, use of robotic surgery has increased despite lack of conclusive evidence of its superiority compared to the laparoscopic approach for many applications. This innovative study examined whether the ACO penetration had any effect on limiting the use of low value robot-assisted surgical techniques.

Methods and Procedures: Using hospital inpatient, emergency and ambulatory center data from the New York State's (NYS) Statewide Planning and Research Cooperative System, we identified cases performed between 2014 and 2019 based on ICD and CPT codes that could be done using either robotic or laparoscopic approaches. Robotic gynecologic (hysterectomies, myomectomies, endometriosis removal and salpingo-oopherectomies) and urologic (prostatectomy and genitourinary reconstruction) procedures were categorized as low value based on evidence of inferiority compared to similar cases performed laparoscopically. Cases of robotic gall bladder removal and bariatric surgery were categorized as uncertain value based on the lack of consensus. ACO penetration, by county, was obtained from the CMS Shared Savings Program. County population data was obtained from the US Census data. For every county, we calculated percentage of population enrolled in an ACO and proportion of surgical procedures performed robotically. We used bivariate and multivariable analyses to examine the association between the ACO penetration and robotic and laparoscopic surgical volumes, by county (n = 62).

Results: The ACO penetration in NYS varied by year and county, between 0% and 10.6%. Across all procedures, the use of robotic-assisted techniques varied from 0.7% for bariatric to 3.1% for gynecologic procedures. Across the counties, we detected high variation in the use of robotic procedures in general surgery (coefficient of variation (CV) = 1.5) but not for gynecologic (CV = 0.7) or urologic (CV = 0.4) procedures. Greater ACO penetration was associated with lower use of robotic gynecologic and urologic procedures (corr. -0.37 and -0.32, $p < 0.05$), greater use of any bariatric surgery ($p = 0.05$) but not with the use of robotic general surgery (corr .07, $p = 0.6$).

Conclusions: These findings indicate that ACOs are sensitive to the information about value of individual procedures and support the role of ACOs as leaders in value-based care delivery. High coefficient of variation for the utilization of robot-assisted technique in general surgery is indicative of significant uncertainty about the benefits of this approach among general surgeons.

P351

Rhabdomyolysis: A Rare, but Morbid Complication of Prolonged Operative Times. Can Heightened Awareness Change Patient Outcomes? Did Covid-19 Play a Role?

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Was COVID-19 infection the cause of rhabdomyolysis or was it patient positioning? Here we report two cases of prolonged operative times, unique operative positioning, obesity and COVID-19 infection in one case, leading to postoperative rhabdomyolysis and AKI.

A 54-year-old morbidly-obese (BMI-39) man was admitted for elective laparoscopic sigmoidectomy and takedown of colovesical fistula. The case took eight hours, in lithotomy position with his arms tucked. POD1, he reported severe bilateral upper extremity pain and decreased mobility. POD2, he was febrile, had elevated creatinine and oliguria. His creatinine kinase was greater than 11,000 mg/dL and was diagnosed with rhabdomyolysis managed with aggressive intravenous hydration. Despite management, he remained febrile without cause. POD8, he tested positive for COVID-19. Bamlinivimab was administered and he recovered uneventfully. His creatinine normalized and he was discharged home without need for renal replacement therapy (RRT). The incubation period of COVID-19 is ~ 5 days. Thus the patient likely contracted COVID-19 preoperatively, as he was symptomatic on POD2. It is possible that his rhabdomyolysis and fever could be his presenting symptoms of COVID-19, based on the timing and presentation postoperatively, although his infection, prolonged surgery, obesity and operative positioning all may have contributed.

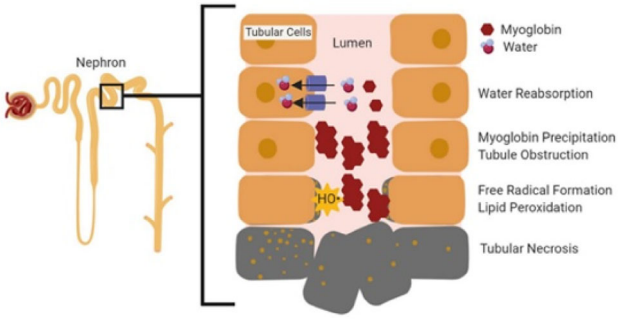
A 31-year-old morbidly-obese (BMI-35) man presented to the ED with a through-and-through GSW to his right thigh resulting in a comminuted subtrochanteric femoral fracture. He was taken to the operating room for a right femoral intramedullary nail and open reduction with internal fixation. The case was prolonged, positioned on a Hana table for nine hours, secondary to patient's body habitus and high-degree of displacement. 23:41, the patient arrived in PACU. 00:16, he was noted to have bilateral lower extremity deficits, oliguria, tachycardia, and severe bilateral gluteal pain believed to be secondary to surgery. SICU was contacted once the patient progressed to motor and sensory deficits. He arrived in the SICU at 4:30AM, his creatinine kinase was greater than 20,000 mg/dL and compartment pressures were above 40 mmHg in both thighs. Bilateral gluteal and thigh fasciotomies were performed emergently. He required RRT for refractory hyperkalemia and metabolic acidosis. He was eventually discharged to acute rehab with persistent neurological deficits.

Although rhabdomyolysis is a rare postoperative complication, with heightened awareness, particularly in morbidly obese patients, undergoing prolonged procedures in unique operative positioning, appropriate intervention can be initiated promptly. This could lead to improved patient outcomes and potentially preventing the development of AKI, compartment syndrome and the need for RRT.

Lithotomy position:

Hana Table:

Pathophysiology of Rhabdomyolysis:



P352

Comparing Colectomy Outcomes Between Veteran Affairs hospitals and Non-Veteran Affairs Hospitals

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Introduction: The Veteran Affairs Surgical Quality Improvement Program (VASQIP) and National Surgical Quality Improvement Program (NSQIP) are large databases designed measure surgical outcomes for their respective populations. However, little research has been done to compare surgical outcomes between VA hospitals and other institutions. We sought to use these databases to compare surgical outcomes in patients undergoing colectomies at VA hospitals compared to non-VA hospitals.

Methods: After IRB approval, records for 271,523 colectomies from NSQIP and 11,597 from VASQIP between the years 2015–2019 were compiled. Demographics, comorbidity, 30-day mortality, and other outcomes were examined using X^2, Student t-test* and Fisher's Exact Test within SPSS version 26.

Results: Patients that underwent colectomy at the VA were more likely to be male (94.3% vs 48.4%, $p < 0.001$) and older (65.7 years vs 61.6 years, $p < 0.001$). Veterans were also more likely to have diabetes (25.3% vs 15.8%, $p < 0,001$), COPD (15.4% vs 5.5%, $p < 0.001$), and congestive heart failure (17.0% vs 1.3%, $p < 0.001$). Despite this, veterans had slightly better 30-day mortality (2.4% vs 2.8%, $p = 0.003$), less organ space infections (2.8% vs 5.8%, $p < 0.001$), or post-operative sepsis (3.4% vs 5.3%). Non-VA patients were more likely to be having emergent surgery (13.4% vs 9.6%, $p < 0.001$), or undergo a laparoscopic approach (57.9% vs 50.2%, $p < 0.001$). Non-VA patients had shorter post-operative length of stay (5.99 days vs 7.32 days, $p < 0.001$), and were less likely to return to the OR (5.3% vs 8.4%, $p < 0.001$).

	NSQIP (n = 271,523	VASQIP (n = 11,597)	p
30-day Mortality (%)	7632 (2.8%)	290 (2.4%)	0.003
Organ Space Infection (%)	15,772 (5.8%)	339 (2.8%)	< 0.001
Post-Operative Pneumonia (%)	7823 (2.9%)	213 (1.7%)	< 0.001
Post Op Sepsis (%)	14,525 (5.3%)	422 (3.4%)	< 0.001
Return to OR (%)	14,319 (5.3%)	1036 (8.4%)	< 0.001

Conclusion: Despite serving significantly different populations, VA hospitals and hospitals enrolled in NSQIP have managed to achieve markedly similar rates of 30-day mortality following colectomy. Further study is needed to better understand the differences between both the populations and surgical outcomes between VA hospitals and non-VA hospitals.

P353

Surgeon Ratings after Laparoscopic Cholecystectomy, Vertical Sleeve Gastrectomy, and Laparoscopic Appendectomy

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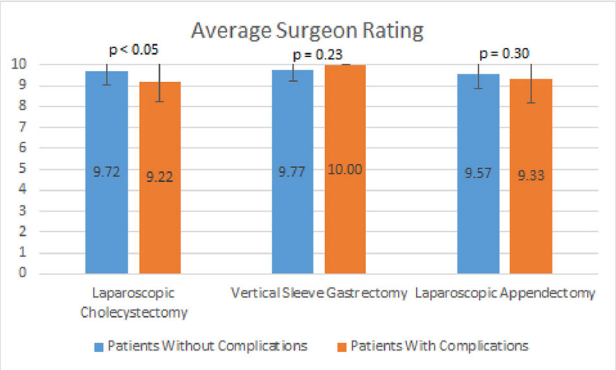
Introduction: There has been an increasing association between patient experience and quality of care. The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) score includes patient experience as a metric in the Centers for Medicare and Medicaid Services (CMS) Value-Based Purchasing Program (VBP) such that poor performance on these patient satisfaction metrics may represent a financial loss for hospitals. We retrospectively reviewed our patients' ratings of surgeon performance in minimally invasive procedures to determine if there was a statistically significant association with post-operative complications.

Methods: A letter with a self-addressed and stamped envelope or an email was sent by our NSQIP coordinator to patients who underwent surgery from December 2017 to June 2021. In this letter, patients were asked, "Using any number from 0 to 10 (0 is the worst and 10 is the best possible surgeon) what number would you use to rate all your care from your surgeon?" Patient responses were entered into a custom field in our NSQIP registry. We then retrospectively analyzed this data with a student's t-test and ANOVA with statistical significance set at $p < 0.05$.

Results: From December 2017 to June 2021, 6,611 patients underwent surgery at our institution and 1,723 patients (26%) provided a surgeon rating. Patients who did not sustain complications provided their surgeon an average rating of 9.65 ± 0.9 whereas those who did experience complications provided their surgeon an average rating of 9.36 ± 1.5 ($p < 0.005$). For patients who underwent vertical sleeve gastrectomy and laparoscopic appendectomy, there was no statistically significant association in surgeon rating between those who experienced complications and those who did not experience complications (Fig. 1). However, those who experienced complications after undergoing a laparoscopic cholecystectomy provided their surgeons with an average rating of 9.22 ± 0.97 as compared with an average rating of 9.72 ± 0.7 in those who did not experience complications ($p = 0.02$).

Conclusion: Patients tend to provide their surgeons with very high ratings. The surgeon rating after certain procedures is affected by complications more so than others.



P354

Implementation of an ERAS Program in Elective Minimally-Invasive Surgery for Colorectal Surgery: An Outcomes and Learning Curve Analysis

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Aim: The distinct advantage of minimally-invasive surgery can be reinforced with the aid of ERAS implementation. The ERAS program for colorectal surgery was established in our institute since 2019. We present the real world data and analyzed the learning curves.

Methods: We retrospectively reviewed the 180 patients receiving elective minimally-invasive surgery for colorectal resection under ERAS programs during the period ofJune, 2019 to July 2021. Patient demographics and intraoperative data including operative time, surgical techniques, conversion rate and postoperative outcomes were collected. Additionally, the learning curves analysis of ERAS compliance and clinical results were conducted.

Results: An overall 161 patients (89.5%) abided by the postoperative care according to ERAS protocol when the rest need to discontinued according to clinical judgement. Growing trend to enrolled patients in robotic group due to less complications noted. The average intravenous fluid amount on the day of operation was 2749 ml. The average time of first stool passage and Foley removal was respectively 1.5 and 1.76 days after operation. The average hospital stay for robotic group was 4.99 days. The incidence of reoperation rate was 1.8%. The data in laparoscopic group will be compared and analyze.

Conclusion: After the period of learning curved, our experiences revealed elective minimally-invasive colorectal resection within ERAS program achieved a significantly beneficial outcome. Nevertheless, the detection of postoperative complications and the timing of withdrawing ERAS program are crucial.

P355

First Case on Time Starts at a University Academic Center—Lessons Learned

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Delays in first-case on-time starts (FCOTS) can lead to an increase in hospital costs and further downstream delays in subsequent cases, which can negatively impact a patient's overall experience. Stony Brook University Hospital (SBUH) set out to conduct a quality improvement project to raise their FCOTS rate of 38% for the year of 2020.

Methods: Direct daily observation, Data collection from Crystal Reports and Surgical Compass, and daily huddle meetings of the OR Throughput Committee, were reviewed to identify opportunities for interventions.

Results: Pre-intervention, January 2020-February 2021, FCOTS were at 38%, by March-June 2021, FCOTS improved to 76% after correcting reasons for delays. It was found that the top three reasons for delays were surgeon site/side verification note, anesthesia site/side verification note, and pre-surgical nurse blue card finalization. The top three reasons for improvements for FCOTS were communication between pre-surgical nurses and surgeon, clarification of expected timeline before patient in OR room (20, 15, 10, 5, minute rule), and patient in OR room on-time. It was found that potentially $350,000 was saved post-intervention due to a decrease in OR minutes from increasing FCOTS.

Conclusion: The success of improved FCOTS for SBUH was rooted in the daily huddle of the OR throughput committee that helped to identify reasons for delay, create and implement real-time solutions for delay improvement, and help solidify communications with all stakeholders.

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Increasing Surgeon Total Experience and Frequency of Performing Procedure Results in Shorter Length of Stay in Patients Undergoing Laparoscopic Cholecystectomy, an HCUP Analysis

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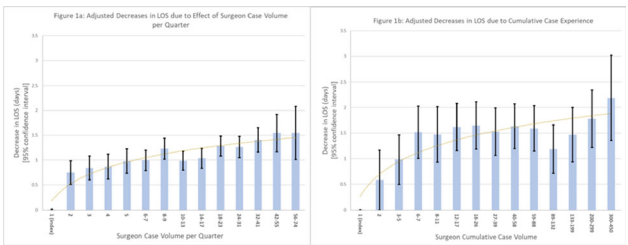
Laparoscopic cholecystectomy (lap chole) is one of the most common abdominal surgeries globally. Substantial costs associated with the procedure are related to hospitalization. Prior work examining the effects of surgeon experience on outcomes in lap chole is predominately in limited datasets and do not quantitatively address of those relationships. The purpose of our study is to evaluate the effect of surgeon experience on hospital length of stay (LOS)—as both a proxy for effective clinical management and as a health services relevant target for quality improvement. We hypothesized that increasing in surgeon's quarterly volume and increasing cumulative experience will each result in decreased (LOS).

Methods: The all-payor Maryland Health Services Cost Review Commission (HSCRC) database was queried for adult patients undergoing lap chole between Q3 2012 and Q2 2020. Case counts were tabulated for each individual surgeon and hospital by year and quarter. Volume categories were then assigned for number of cases per study quarter (n = 14) and for cumulative cases for surgeons beginning during the study period (n = 14) based on a distributional analysis of counts per surgeon and surgeons per category. LOS was tested in univariate analysis followed by multivariable regression models based on frequency and cumulative experience with clustering for individual hospital factors (lap chole volume, geography, size, academic and trauma status).

Results: A total of 1,745 surgeons performed 82,947 lap choles in the study period. A subset of 1,403 surgeons began practice in Maryland during the study period and performed 20,037 cases. Surgeon distribution was log-normal for both cumulative and frequency-based volume categories. LOS ranged from 0 to 138 days with mean = 1.96 and median = 1. Age, gender, insurance type, race, urgent presentation, and severity of illness were significantly associated with differences in LOS (all $p < 0.02$). Increasing surgeon frequency of procedure performance and cumulative experience were associated with significant decreases in LOS (max effects -1.55 days, -2.19 days, respectively). (All $p < 0.0005$, Fig. 1a, b).

Conclusions: After adjusting for age, gender, race, insurance type, severity of illness, and urgent presentation; increasing quarterly case volume and total cumulative experience independently reduce LOS with a logarithmic progressive effect as experience increases. At its maximum, this effect in both models was greater than all factors except the top decile of severity of illness. Maximizing surgeon experience may increase the proportion of patients that can avoid hospitalization and reduce the number of hospital beds needed to care for this population.



P357

Home Based Primary Care is Safe in Patients with Gastrostomy Tubes

Danielle Abbitt, MD[1]; Carolyn Horney, MD[2]; Kevin Choy, MD[1]; Teresa S Jones, MD[2]; John T Moore, MD[2]; Edward L Jones, MD[2]; [1]University of Colorado; [2]Rocky Mountain Regional VA Medical Center

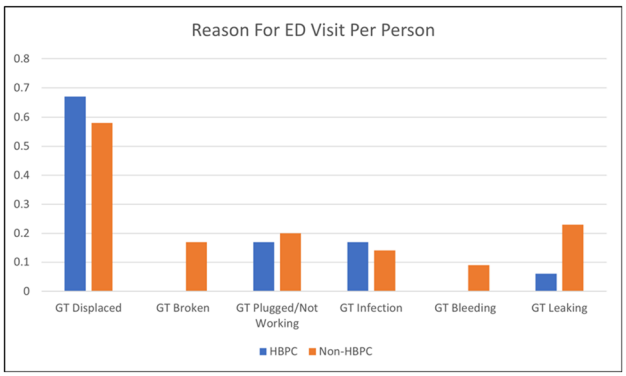
Background: Similar to the American population, veterans are aging at a greater rate than in previous decades and with this brings about concerns regarding the associated co-morbidities and disability. The VA has developed Home Based Primary Care (HBPC) to aid individuals with complex chronic disabling diseases with a goal to increase independence and decrease Emergency Department (ED) utilization. One of the services provided by HBPC is gastrotomy tube (GT) changes. These changes occur at regular intervals once a tract is established.

Methods: We completed a retrospective review of patients of who had a GT placed from January 2010 to September 2020 and received care at a tertiary VA Medical Center (VAMC). Patients enrolled in HBPC were compared to those not enrolled to evaluate ED utilization and number of GT changes.

Results: Ninety-four patients underwent GT placement during the study period, 18 (19%) were enrolled in HBPC. Mean age of HBPC patients 63 vs. 65 in non-HBPC group. Patients in HBPC were more likely to have a neuromuscular disorder (39%) vs a head and neck malignancy in the non-HBPC group (55%), p = 0.027. The average number of GT replacements were not significantly different (3.5 vs 2.7, p = 0.51). Being enrolled in HBPC did not increase the need for ED care with 50% (9) requiring ED care vs 55% (42), p = 0.79. The most common indication for an ED visit was GT dislodgement in both HBPC (12, 60%) and non-HBPC (44, 35.2%). Patients in HBPC had no visits for broken GT vs 10.4% (13) in non-HBPC patients, (p = 0.0092), and no visits for GT bleeding vs 5.6% (7), p = 0.0093. Patients in HBPC reported GT leaking as their reason for visit less often, 5.0% (1) vs 8.9% (18), p = 0.0371.

Conclusion: Home-Based Primary Care management of gastrostomy tubes, including prophylactic changes, reduces the number of ED visits related to GT leakage, bleeding or broken devices. While in-home GT care is not universally provided by HBPC, the success of this program represents a unique opportunity to further reduce ED utilization through expansion of this service to the over one hundred HBPC sites around the country.

Fig. 1 Gastrostomy tube (GT) related reason for Emergency Department (ED) visit per person for Home Based Primary Care (HBPC) vs non-HBPC



P358

The Affordable Care Act, a Financially Viable Model for Emergency Surgery: Acute Appendicitis Model

Nitasha Sharma, MD, MS[1]; Amarseen Mikael, MD[2]; Abdul Waheed[1]; Matolo Nathaniel, MD[1]; [1]San Joaquin General Hospital; [2]Riverside Community Hospital

Introduction: The Affordable Care Act (ACA) was signed into law on March 10, 2010. The ACAwas designed as a comprehensive reform law to help millions of Americans gain access to insurance coverage, ultimately saving lives, improving access to care, and strengthening the health care system. Some argue that this law has revolutionized care and saved lives of many patients with lower incomes, preexisting conditions, or other healthcare disparities, many of whom would have been without insurance coverage prior to the ACA. We hypothesize that the ACA increased access to health insurance, which resulted in a larger proportion of patients presenting in the early stages of acute appendicitis, thus decreasing the overall cost of care for these patients.

Methods: We conducted a retrospective chart review of 1,724 patients who presented between 06/20/2010 and 11/17/2016 with acute appendicitis. Patients were placed into "pre- "and "post-ACA" groups based on an ACA implementation date of 12/01/2013. Data collected on each patient included age, gender, time between onset of symptoms and presentation, comorbidities, intervention, pathology results, and insurance status.

Results: Of 1,724 patients, only 748 met our inclusion criteria. In the post-ACA group, 12.2% of patients presented 4 days after symptom onset as compared to 17.2% in the pre-ACA group (5% difference). This would result in a significant financial impact on the healthcare system due to increased lengths of stay and complications.

Conclusions: At this time, our data is still in its preliminary stages of analysis. However, there was a 5% decrease in the rate of patients who presented at 4 days after onset of symptoms post-ACA, which would result in a significant financial impact on the healthcare system.

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A Medium-Term Comparison of Quality of Life and Pain After Robotic or Laparoscopic Cholecystectomy

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Introduction: The conventional laparoscopic approach for cholecystectomy has remained the standard of care as prior studies comparing short-term outcomes of the laparoscopic versus robotic-assisted approach have demonstrated similar results. However, the difference in medium-term outcomes remains unclear. The objective of this study was to compare medium-term outcomes between both techniques using validated quality of life and pain assessments.

Methods: Patients who underwent robotic-assisted cholecystectomy (RC) or laparoscopic cholecystectomy (LC) between 2012 and 2017 at a single academic institution were examined. Inclusion criteria included elective outpatient cases, age 18 + years, and cholecystectomy as the only surgery performed. Cases that were converted to open were excluded. All procedures were performed by surgeons who were fellowship-level trained and well-versed in both laparoscopic and robotic technologies. Patients were contacted by telephone in 2019 and completed two standardized surveys to rate their quality of life (Medical Outcomes Study Short Form-20 [SF-20]) and pain (Short Form McGill Pain Questionnaire 2 [SF-MPQ-2]). Data analysis was performed using STATA v.13.0.

Results: Of the 340 patients that were screened, 122 (35.8%) completed both surveys. In this cohort, 93 (76.2%) underwent RC and 29 (23.8%) underwent LC. The two groups (RC vs LC) were similar based on mean age (47.9 vs 45.5 years, p = 0.48), gender (66.7% vs 72.4% female, p = 0.56), race (86.0% white/5.4% black vs 72.4% white/13.8% black, p = 0.2), insurance status (98.9% vs 100.0% insured, p = 0.58), mean body mass index (33.5 vs 31.5, p = 0.24), and mean Charlson comorbidity index (1.52 vs 1.03, p = 0.23). Less patients in the RC group had a history of steroid medication use compared to the LC group (16.1% vs 34.5%, p = 0.03). Responses from the SF-20 survey demonstrated no overall significant difference in quality of life between the groups. Based on the SF-MPQ-2 measurements of pain on a continuous 0–10 scale, the LC group had higher severity of "tiring-exhausting pain" (p = 0.04), "electric-shock pain" (p = 0.003), and "shooting pain" (p = 0.05). There was overall no significant difference in the severity of the remaining types of pain included in the SF-MPQ-2 between the two groups. The "overall intensity" of pain in the "gallbladder region" between the groups was similar at the time of follow-up (p = 0.31).

Conclusions: Quality of life over 2 to 7 years following time of surgery is comparable for robotic-assisted versus conventional laparoscopic cholecystectomies. The laparoscopic approach may be associated with a higher severity of subset categories of pain, but overall pain between the two approaches is comparable.

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Compromised Robotic Surgical Visualization: Archaic Issues in a Modern Operating Room

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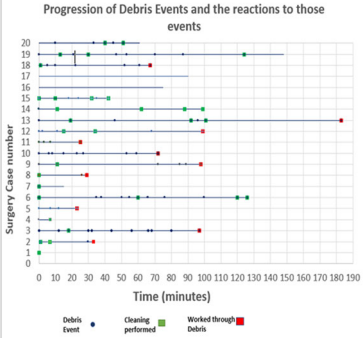
Robotic Assisted Surgery (RAS) has rapidly developed a foothold in today's ORs due to incredible technological advancements yielding tangible advantages for surgeons. A major focus for such enhancements lies in the surgical visualization of the RAS platforms. However, there is still need for improvement inside this revolutionary field. This study explores the existing shortcomings of RAS vision, specifically concerning visual occlusions caused by a variety of debris events, via observational data tracked across RAS cases to better understand such needs.

This study includes visual case observations during n = 20 RAS procedures. The collection of debris events were defined by discernible distortion of surgical vision caused by the deposition of bodily debris (fog/condensation, tissue, bodily fluids, etc.) onto the lens surface. Time with "suboptimal vision" was defined as time spent performing surgery with such distortion present (i.e. time spent cleaning and time spent with distortion left uncleaned/ignored). Primary metrics were time spent operating under suboptimal vision and clear vision, cleaning time, and number of debris events. Additionally, interactions and relative impact regarding the RAS scope relative to visualization outcomes were assessed with the inclusion of clinician interviews.

Across n = 20 surgical cases, 32 of 78 debris events were ignored, and contributed to an average of 56.4% of case observation times showing suboptimal vision. Average cleaning time of the RAS scope was 0.61 ± 0.62 min, with a maximum cleaning time of 1.95 min. In one case 82%, or 146 min, of the overall 178 min was spent under suboptimal vision, while in two case observations (t = 90, 100 min), there were no apparent debris (or cleaning) events. The progression of debris events and clinicians' reactions with corresponding time data are shown in Fig. 1.

a.



b.

Case number	Cleaning time (min)	Suboptimal vision (min)	Clear vision (min)	Total time (min)
20	0.45	29	21	50.45
19	1.01	72	74	147.01
18	1	56	4	61
17	0	0	90	90
16	0	0	75	75
15	1	37	8	46
14	1.65	17	89	107.65
13	1.67	146	30	177.67
12	0.5	80	19	99.5
11	x	25	x	25
10	x	72	x	72
9	X	37	61	98
8	X	3.5	26	29.5
7	0.5	1	14	15.5
6	1.95	109	10	120.95
5	x	23	x	23
4	0.5	7	x	7.5
3	0.5	79	12	91.5
2	1	3	32	36
1	0.5	1	60	61.5
Average	0.815	39.88	39.06	71.74

Figure 1. (a) Progression of debris events in vision in 20 cases over time. If a debris event was cleaned within 2 minutes, no reaction event was recorded. (b) Metrics of the quality of surgical vision across 20 cases. Note. X indicates missing or unconfirmed data

This study demonstrates a clear clinical need to address the current standard for laparoscopic vision shortcomings regarding lens debris events especially as over half of all surgery time observed included operating under suboptimal vision. Clinicians polled after cases described the need to work under suboptimal vision often related to the importance of a specific part of the case being more important than perfect clarity, or minor debris events not being as big of a concern during that particular point in the case. This current standard of suboptimal vision calls attention to the cumbersome process of the RAS scope cleaning and presents a clear and viable chance to improve visualization platforms and potentially impact surgical care in the future.

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A Two-Week Dedicated Robotic Simulation Rotation for Genernal Surgery Residents was Associated with Improved Self-rated Confidence and Performance of Technical Skills

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Introduction: Over the past decade, utilization of robotic surgery has become increasingly widespread. However, concerns about training and comfort level have prevented resident console involvement. Formal training is essential for skill acquisition, but hard to incorporate. We hypothesized that instituting a proficiency-based training curriculum with protected time can improve resident confidence and comfort level performing on the training console.

Methods: University-based general surgery residents in their clinical 3rd post graduate year (PGY3) were assigned the curriculum that consisted of the following: instrument mastery, simulation exercises, robotic suturing, inanimate drills, laparoscopic/open technique comparisons, mentor sessions, and real-time operative exposure. Curriculum evaluation surveys were given to participants on completion with Likert scales 1 (low) to 5 (high).

Results: In total, 16 residents were assigned the curriculum: 7 (42.8%) males and 9 (56.3%) females with a median age of 31 years (range:29–36). All 16 (100%) completed every component of the curriculum. Before starting, 12 (75%) residents reported console surgeon experience (average of 3.6 robotic operations) and 15 (94%) rated their robotic skill level at a 1. After completing the curriculum, 5 (31%) rated their skill at a 2, 8 (50%) rated themselves at a 3, and 3 (19%) rated themselves at a 4 out of 5. When rating their comfort level prior to the curriculum, 10 (63%) indicated they were not comfortable at all with the robot ("1"), 5 (31%) were uncomfortable ("2") and 1 (6%) resident was neutral ("3"). The comfort level of the residents increased by an average of 2.5 on the Likert scale after completing the curriculum. When asked about the most helpful aspects of the curriculum 9 (56.3%) residents noted the biotissue exercises, 4 (25%) stated the mentor sessions and 4 (25%) stated repetition/time spent on the robot. When asked about the least helpful aspects of the curriculum, 7 (43.8%) stated laparoscopy, 5 (31.3%) stated "none", 3 (18.75%) stated the virtual simulation, and 1 (6.25%) stated the hernia drills. When asked about conducting drills outside of the rotation, 16 (100%) expressed interest in setting up their own drills for continued practice on their own time; however, only 7 (43.75%) residents expressed interest in doing drills at night and/or on weekends.

Conclusion(s): Proficiency-based training demonstrated improvement in self-reported comfort and skill level on the robotic platform. Resident attitudes also indicated a promising future for protected mastery-based training. Studies translating into increased console time for residents are ongoing.

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Assessing Visualization in Robotic-Assisted Surgery: Demystifying a Misty Lens

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Introduction: Robotic-assisted laparoscopic surgery (RAS) is an exciting and rapidly growing surgical field. Despite major technological advancements within the field, there are still shortcomings to explore and address. This study assesses the prevalence of suboptimal vision in minimally invasive robotic surgery and corresponding factors regarding the related surgical conditions.

Methods: 33 minimally invasive robotic surgeries, performed using Da Vinci XI, were observed across three surgical subspecialties: general, urology, and OB/GYN. Lens occlusion events were monitored and defined as the presence of a visual distortion caused by debris deposition on the scope lens. Occlusion events, lens cleaning duration, and associated "active instrumentation" were recorded. Descriptive statistics were used to summarize duration-based variables and a one-factor ANOVA test with Tukey–Kramer post-hoc analysis compared the presence of active instrumentation.

Results: Cases averaged 134 $\pm$ 77 min. Active instrumentation ANOVA during lens occlusions demonstrates statistically significant variation between categories ($F7, 256 = 7.22$, $P = 6.83E\text{-}8$). Post-hoc Tukey HSD shows electrocautery devices were active significantly more during occlusion events (36.44%) than other surgical instrument categories, aside from "Camera Movement" (21.46%). On average, lens cleaning occurred every 49.81 $\pm$ 38.69 min despite lens occlusion occurring every 26.57 $\pm$ 17.18 min. Of the operative time across surgeries observed, 40.59 $\pm$ 26.83% was conducted with visual distortion. A total of 1.16% $\pm$ 1.05% of surgery time observed was spent cleaning a lens occlusion.

Conclusion: Standard deviation values indicate a high degree of variability between surgical cases for nearly all metrics. The greater presence of active electrocautery devices in the surgical field during lens occlusion events also suggests an interesting correlation between the potential impact of cautery activity relative to distorted surgical vision. Such considerations might yield insight into means to address the issue and improve surgical vision clarity throughout procedures. This is doubly important given a total of 40.59% of all surgical observation time was spent with an occluded lens. It is interesting to note that although only 1.16% of the time was spent cleaning the scope, surgeons operated under suboptimal conditions for nearly 35 $\times$ as long as it would take the clear lens, potentially indicating a tendency to avoid cleaning the lens to disrupt surgery. Future research may examine the impact of occluded visualization and lens cleaning on other aspects of surgery.

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Utility of the Surgical Robot In Peritoneal Dialysis Catheter Placement

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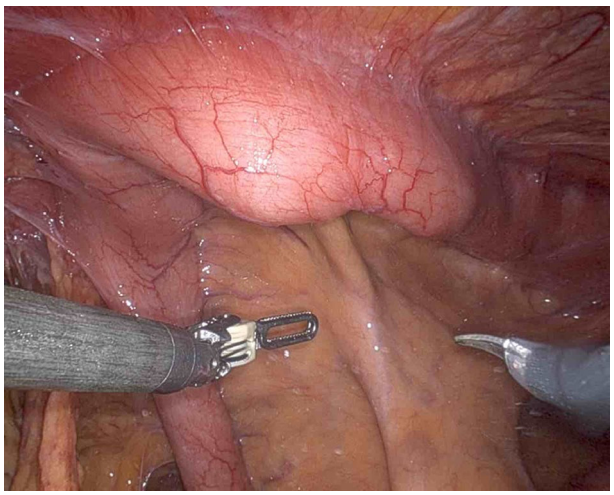
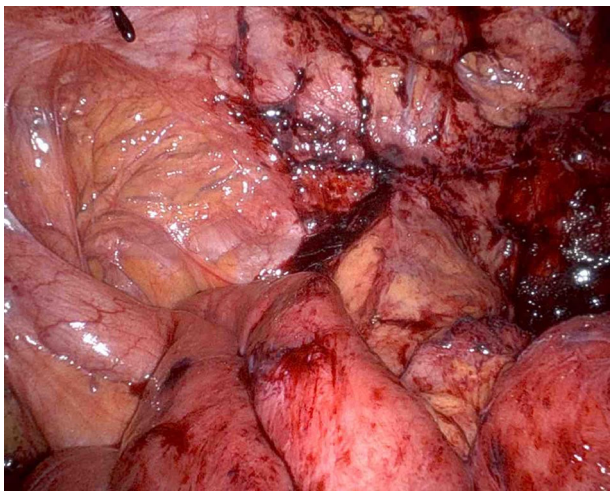
Introduction: Peritoneal Dialysis (PD) is a growing form of renal replacement therapy (RRT) for patients with end-stage renal dialysis (ESRD). Extensive intraperitoneal adhesions and complex abdominal wall hernias are barriers to application in some patients.

Methods and Procedures: Case 1: A 66-year-old male with history of radical cystoprostatectomy, bilateral nephroureterectomy, pelvic lymph node dissection and sigmoid colectomy with primary anastomosis for treatment of high-grade papillary urothelial carcinoma and sigmoid stricture underwent PD catheter placement. On laparoscopy, extensive small bowel and omental adhesions were appreciated. The robot was utilized for extensive adhesiolysis while keeping select adhesions as a natural omentopexy. On completion, the catheter had excellent flow. The patient continued PD at 2-month follow-up.



Small bowel and omental adhesions to abdominal wall



Pelvis following extensive lysis of adhesions

Case 2: A 70-year-old female with a large ventral hernia and past surgeries notable for total abdominal hysterectomy with bilateral salpingo-oophorectomy and open cholecystectomy underwent PD catheter placement. On laparoscopy, a large ventral incisional hernia in a swiss-cheese pattern and extensive adhesions connecting small bowel to abdominal wall were appreciated requiring 3 h of robot-assisted lysis of adhesions and mesh placement. The PD catheter was then placed with excellent flow appreciated. The patient returned one month later requiring PD catheter repositioning and had successful PD on postoperative day 1. The catheter is functional at 3-month follow-up.

Results: Two patients successfully began PD following use of the surgical robot to address intraperitoneal adhesions and abdominal hernias for PD catheter placement.

Discussion: The Advancing American Kidney Health Executive Order of 2019 calls for an investment in PD given its clinical and financial benefits. Clinically, studies show patients report decreased burden of kidney disease, fewer adverse symptoms, and improved cognitive status with peritoneal dialysis. Financially, the United States Renal Data System reports a $14,450 per patient per year Medicaid saving on PD compared to hemodialysis for over 500,000 patients on RRT. Key factors for success of peritoneal dialysis include lack of intraabdominal obstruction and resolution of hernias. As such, patients with complex abdominal hernias or surgical histories concerning for extensive adhesions are often considered noncandidates for PD without surgical intervention. In these cases, the surgical robot was utilized to overcome said barriers for successful peritoneal dialysis catheter placement and function.

Conclusions: The surgical robot can be used to expand patient selection for PD to patients who have complex hernias or significant intraperitoneal adhesions.

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A Single Intuition's Experience with the Learning Curve for Robotic Assisted Transabdominal Preperitoneal Inguinal Hernia Repair

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Introduction: Within the past decade the prevalence of robot-assisted laparoscopic surgeries has vastly grown across numerous specialties. For surgeons who want to adopt and master this operative technique, a learning period is required. The length of these periods is dependent on operation types, so we sought to analyze the learning curve of robot-assisted laparoscopic transabdominal preperitoneal (TAPP) inguinal hernia repairs.

Methods: Among three surgeons (A, B, and C) at our institution, 140 primary, unilateral, and uncomplicated robot-assisted laparoscopic TAPP inguinal hernia repairs were collated, starting from when each surgeon adopted the robotic approach. We excluded cases that involved a difficult dissection, extensive lysis of adhesions, incarcerated hernias, recurrence, bilateral repairs, and umbilical repairs. To analyze the learning curve, we utilized Minitab 17 statistical software to calculate the moving average of operative times. In each of these analyses the operation was considered learned once each surgeon's operative times were consistently at or below their average operation time. Of note, we utilized dock and undock times to calculate the operative time with the robot.

Results: The learning curves for surgeons A, B, and C were achieved at cases 19, 16, and 23, respectively. Interestingly, the surgeon with the most operative experience (surgeon B) had the shortest learning period and average operation time in comparison to the other two surgeons. More specifically, the average operation times of Surgeons A, B, and C were 67.45 min, 45.57 min, and 67.1 min, respectively. Additionally, it is critical to acknowledge that each surgeon underwent two phases of learning, which is illustrated by the two peaks in each graph. After the second peak, each surgeon's operation time started to become very consistent with being at or below their average.

Discussion/Conclusion: Overall, we found that the learning period for a robot-assisted laparoscopic TAPP inguinal hernia repair ends between a surgeon's 16th and 23rd operation at our institution. As we are already in the era of minimally invasive surgery, it is also comprehensible that surgeons with more extensive experience in laparoscopic TAPP inguinal hernia repairs can have shorter learning periods.

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Standardized Annotation of Robotic Proctectomy for Objective Performance Metric Analysis

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Objective: Objective performance metrics (OPMs) derived from instrument kinematics and surgeon console events (i.e., camera movement, instrument movement, clutching, energy use) can be recorded during robotic surgery and used to provide objective information regarding efficiency and safety of certain movements, best practices for training robotic surgeons, and predictors of patient post-operative events. OPMs can be reported for an entire procedure or individual surgical tasks. Here we describe a process to develop an annotation card for robotic proctectomy that enables consistent interpretation of surgical tasks through video review. We also report on types of OPMs we are recording.

Methods: We defined all individual tasks of robotic proctectomy, including indicators of start and stop for each task, as well as descriptors of events during and goals of each task. Based on these tasks, we created an annotation card for robotic proctectomy. We trained three video reviewers to use the annotation card to timestamp and label each task of robotic proctectomy videos. We reviewed two procedures as a group to clarify language and start/stop parameters, and then had four additional procedures reviewed by all three reviewers independently. Auditing revealed excellent agreement across all reviewers. Elective robotic proctectomies performed by our surgeons were recorded using an Intuitive Data Recorder (IDR), which captures endoscopic video and OPM data. All IDR data from these procedures were deidentified and sent to Intuitive Surgical Inc. for data interrogation. Each video was annotated independently by two reviewers, with any discrepancies resolved by combined review with a third reviewer. These annotations were used to match IDR data with appropriate procedure tasks.

Results: We divided robotic proctectomy into 20 tasks. We recorded IDR data from 31 procedures which have been matched to annotated video. The resulting data includes more than 1550 discrete surgical tasks each with 162 OPMs. The OPMs are separately reported for each surgeon console and each patient cart arm. We have data reflecting instrument movements (distance, speed, acceleration, jerk, roll, yaw, pitch), camera movements (frequency, distance), energy use and clutch events.

Conclusion: We developed a method of annotation for robotic proctectomy allowing standardization of key tasks so that OPMs may be analyzed to provide objective evaluation of robotic surgeon performance and operation flow. We have recorded 31 procedures resulting in over 2.5 million data points that may be used for future OPM analysis.

Task ID	Task Name	Description	Start Parameter	Stop Parameter	Comments
1	Initial exposure	Initial exploration of abdomen, inspect for metastasis, adhesiolysis, retract bowel for visualization of target anatomy. Often, omentum is flipped over transverse colon and small bowel is retracted for exposure.	Initial tool interaction with bowel or adhesion	Initiate any dissection task/step below	Surgeon often will work with assistant in coordinated fashion to get small bowel out of pelvis - ie, hand over hand technique
2	Mesenteric dissection, identification and skeletonization of named artery	Pedicle is exposed by retracting sigmoid mesentery and beginning mobilization near sacral promontory. IMA is skeletonized. Lymph nodes around IMA should be dissected and removed with specimen.	First tool interaction with mesentery (i.e., scoring or grasping or retracting) around IMA with sigmoid on tension.	IMA skeletonized, ready for transection	During mobilization the ureter and gonadal vessels (optional) will be identified to avoid injury.
3	Ligation and division of named artery	IMA is ligated and divided, utilizing vessel sealer, clip applier, vascular stapler, laparoscopic device or stapler.	Tool interaction with IMA	IMA transected	Ureter typically is identified. Gonadal vessels may be identified. There may be identification of the aorta and/or iliac bifurcation.
4	Mesenteric dissection, identification and skeletonization of named vein	Pedicle is exposed by retracting left colon mesentery and beginning mobilization near duodenum. Dissection around IMV with fine instrument.	First tool interaction with mesentery (i.e., scoring or grasping or retracting) around the IMV with left colon on	IMV skeletonized, ready for transection	During mobilization the duodenum (optional) will be identified to avoid injury.
5	Ligation and division of named vein	Transection of IMV with any devices from IMA step.	Tool interaction with IMV	IMV transected	Duodenum may be separated from these tissues. May overlap with medial to lateral dissection.
6	Splenic flexure mobilization: Medial to lateral (submesocolic) (optional)	View is redirected towards LUQ, with the aim of freeing up the proximal end of the desending colon for a tension free anastomosis	Tool interation with mesentery in left middle quadrant, inferior to IMV, anterior to the aorta (blunt or sharp	Splenic flexure mobilized (surgeon backs out camera)	Pancreas comes into view as landmark of superior extent of dissection.
7	Splenic flexure mobilization: Lateral to medial (optional)	View is redirected towards LUQ, with the aim of freeing up the proximal end of the desending colon for a tension free anastomosis	Tool interaction with lateral attachments while left colon is retracted medially	Splenic flexure mobilized (surgeon backs out camera)	Pancreas comes into view as landmark of superior extent of dissection.
8	Splenic flexure mobilization: Supracolic (optional)	View is redirected towards LUQ, with the aim of freeing up the proximal end of the desending colon for a tension free anastomosis	Tool interaction with gastrocolic ligament while colon retracted caudad	Splenic flexure mobilized (surgeon backs out camera)	Pancreas comes into view as landmark of superior extent of dissection.
9	Mobilization of the rectum: Medial to lateral	Mobilization of rectum and mesorectum from sacral attachments. Surgeon will identify and preserve presacral nerves.	First tool interaction with medial mesorectum	Preceeds either IMA ligation or posterior TME	Left pelvic structures (ureter, iliac vessels) will come into view as dissection is completed
10	Mobilization of sigmoid and left colon: Medial to lateral	The plane between mesentery and posterior peritoneum is bluntly or sharply (vessel sealer) dissected laterally and cranially. Once mesentery has been mobilized, lateral attachments (Line of Toldt) are dissected from the abdominal sidewall.	Tool interaction with the mesentery at the ligated pedicle	Mobilization of the line of Toldt just inferior to the splenic flexure	
11	Mobilization of sigmoid and left colon: Lateral to medial	All lateral attachments of descending and sigmoid colon are divided enabling the descending and sigmoid colon to be separated from the left abdominal wall. Ureter often identified at this time.	First tool interaction with Line of Toldt while sigmoid is retracted medially	Surgeon backs out camera, begins to reposition colon for subsequent step	
12	Pelvic rectal dissection with TME: Posterior dissection of rectum	Surgical view is moved into pelvis to mobilize the rectum. This is the posterior dissection, operating from 3-9 o'clock. Preserving pelvic autonomic nerves.	Tool interaction to expose posterior peri-rectal tissue	Posterior rectum is dissected (surgeon backs out camera)	
13	Pelvic rectal dissection with TME: Anterior dissection of rectum	Preserving pelvic autonomic nerves, the anterior plane for dissection either forward or behind Denovillier's fascia. Protect anterior anatomy (vagina or prostate)	Tool interaction with anterior peri-rectal tissue	Anterior rectum is dissected (surgeon backs out camera)	
14	Pelvic rectal dissection with TME: Right lateral dissection of rectum	Separating rectum and mesorectum from lateral pelvic wall.	Tool interaction to expose right lateral dissection	Right lateral dissection is completed (surgeon backs out camera)	
15	Pelvic rectal dissection with TME: Left lateral dissection of rectum	Separating the rectum and mesorectum from lateral pelvic wall. Left side can be more difficult because of sub-optimal view (based on port placement)	Tool interaction to expose left lateral dissection	Left lateral dissection is completed (surgeon backs out camera)	
16	Division of mesorectum	Dissection and ligation of all vessels of mesorectum to skeletonize rectum	Tool interaction with mesorectum	Rectum skeletonized	Typically done with scissors, bipolar, vessel sealer
17	Rectal transection	Laprascopic or robotic stapler used to divide rectum. Transection line can be verified with Firefly. May require multiple stapler fires and variation in regularity/distance/margin.	Stapler enters the abdomen makes contact with rectum	Rectum is divided (after last staple load fired)	May be done without stapler, instead with scissors
18	Division of mesocolon	Dissection and ligation of all vessels of the mesocolon to skeletonize colon	First tool interaction with proximal colon (typically will begin after surgeon relocates camera higher in abdomen from	Colon is skeletonized	Typically done with scissors, bipolar, vessel sealer
19	Proximal colon transection	Identify the location of proximal bowel resection. Transection line can be verified with Firefly. Stapler traditionally used.	Stapler enters the abdomen makes contact with colon	Proximal colon is divided (after last stapler load is fired)	May be done without stapler, instead with scissors
20	Testing for anastomotic leak (optional)	Pelvis filled with saline and rectum insufflated with air to ensure no bubbles are seen. May be done with syringe and/or sigmoidoscopy.	Last tool interaction with newly anastamosed bowel as abdomen is filled	Start of suction of saline out of abdomen	Often, Tilepro will be used during sigmoidoscopy
21	Colorectal anastomosis	Reconnection of proximal colon to rectal stump. Often transanal circular stapler used. Stapler is passed through transected rectal stump. Anvil is connected to stapler. Surgeon ensures no tension and no twisting of colon. Stapler is fired.	First tool interaction with proximal colon in order to insert anvil.	Last tool interaction, anastomosis is complete	This may be done with pure intracorporeal technique.

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Temporal and Institutional Trends in Robotic Surgery

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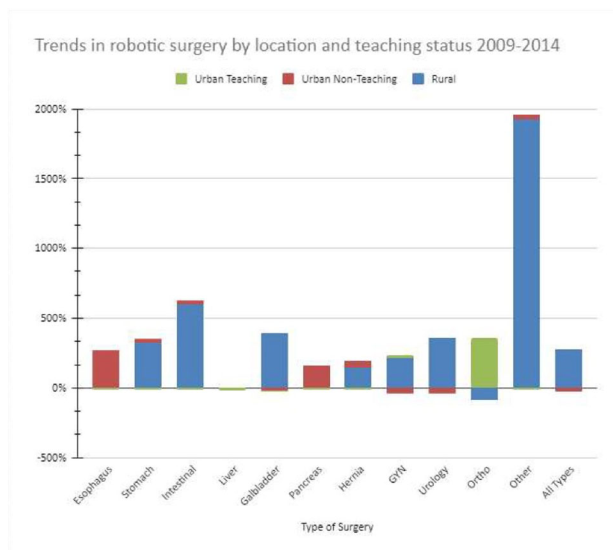
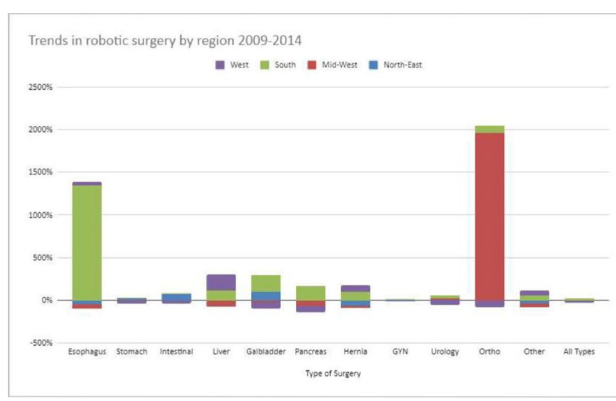
Introduction: Robotic surgery has become increasingly prevalent in general surgery practice. While previous studies have shown the safety and efficacy of robotic assistance in laparoscopic general surgery procedures, few studies have evaluated the temporal and regional trends in implementation. In our retrospective population-based study, we aim to evaluate the national trends in robotic surgery.

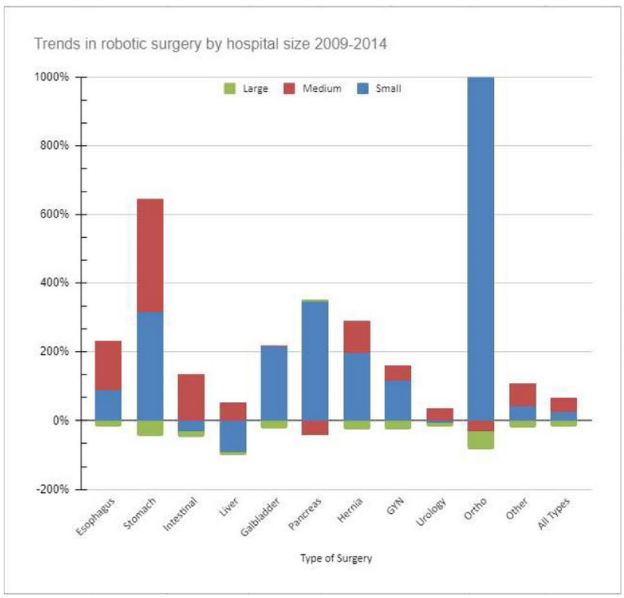
Methods: National Inpatient Database (NIS 2009–2014) was used to identify adults who underwent robotic assisted surgery (ICD 9 codes 17.41 to 17.49). Robotic procedures related to seven abdominal organ systems were compared against the trends of Urology, Gynaecologic, and Orthopedic robotic procedures. Discharge weights were applied to calculate National temporal trends separated by hospital size, teaching status and US geographic region.

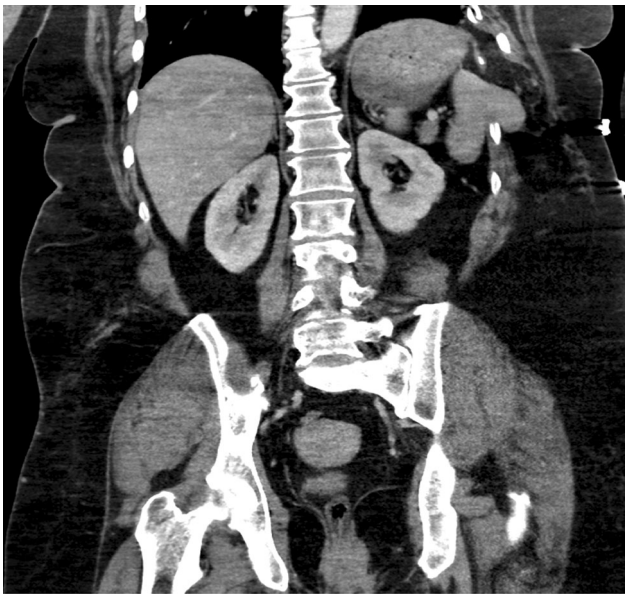
Results: 894,163 patients received a robotic assisted procedure between 2009 and 2014 with 64% increase in utilization. The largest percent change was witnessed in biliary robotic procedures with 2984% change in utilization, followed by hernia (1376%). Lowest percent change was witnessed in esophageal procedures with 114% increase. Medium sized hospitals had the largest change in robotic utilization (41%), with large institutions seeing 18% decrease. Gastric procedures were the most common robotic procedure performed at small institutions (7917 total cases; 316%). Large institutions saw an overall decrease in gastric (-47%), esophageal (-17%), small and large intestinal (-16%), and hepatic (-7%) robotic procedures. Rural non-teaching hospitals saw the largest increase in robotic surgery (274%). Urban non-teaching hospitals saw a decrease of 29%. While urban teaching institutions saw a 20% and 6% increase in gynecological and urological procedures, an overall decrease was seen in esophageal (-10%), gastric (-12%), intestinal (-11%), hepatic (-17%), biliary (-10%), pancreatic (-11%) and hernia procedures (-14%). Biliary procedures saw the largest increase in rural institutions (740 cases; 392%), followed by hernia (144% increase). South region of the nation had the largest increase in robotic procedures (23%). No change was seen in the use of robotic surgery in the northeast region with the midwest and west seeing an overall decrease (-4% and -22%, respectively).

Conclusion: Our study highlights the increase in use of robotics for both general and specialty surgery, with an increase in utilization over time. Increased incidence of robotic surgery in smaller, rural institutions with overall decrease in larger, urban teaching hospitals suggests increasing comfort in robotic surgery in the community setting. Further studies are necessary to evaluate the factors associated with increased utilization in smaller institutions.









P369

Elective Robotic Repair of a Traumatic Abdominal Wall Hernia

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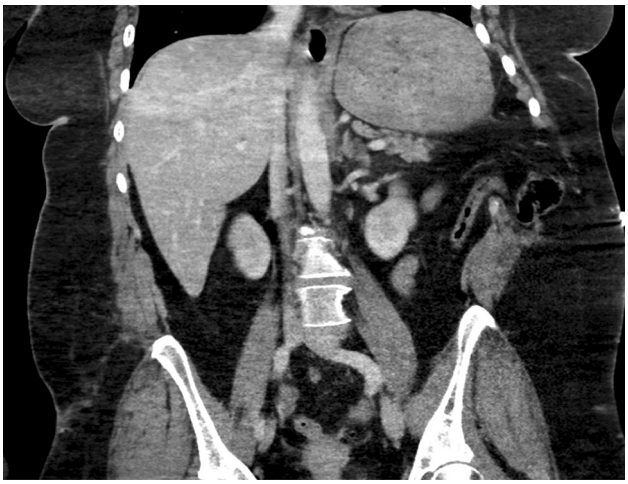
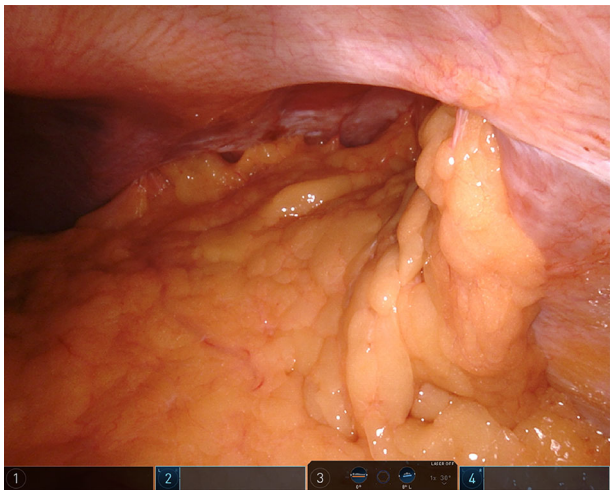
Introduction: Traumatic abdominal wall hernias (TAWHs) are an uncommon pathology with a prevalence less than 1% and are typically secondary to high-speed blunt trauma mechanisms such as in motor vehicle collisions (MVC). These mechanisms cause shear stresses and increased intra-abdominal pressure that lead to disruption of the abdominal wall. Surgical repair of such defects is indicated for prevention of complications secondary to herniation, such as incarceration and strangulation of abdominal viscera. Open and laparoscopic techniques have been described, with and without mesh usage, and timing ranging from immediate to delayed repair. We report a case of a delayed robotic hernia repair in a TAWH.

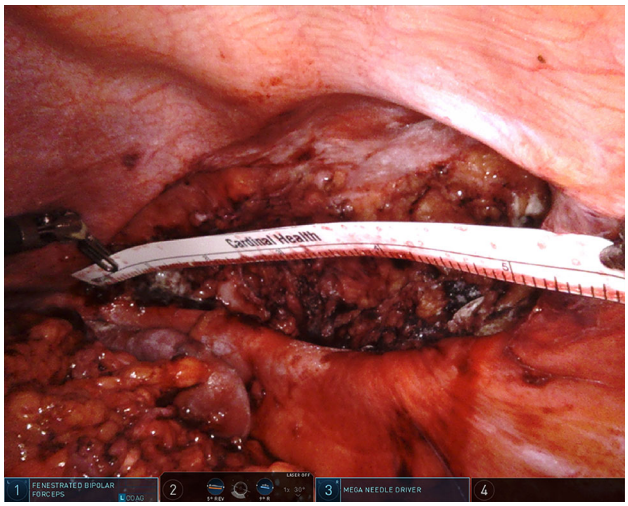
Case: The patient is an obese, 54 year-old female restrained driver who was a trauma activation following a high-speed MVC. She was hemodynamically stable with an intact primary survey. Trauma workup revealed a left-sided humerus fracture, trimalleolar fracture and 8th—10th rib fractures with an associated abdominal wall hernia containing portions of the spleen and colon.

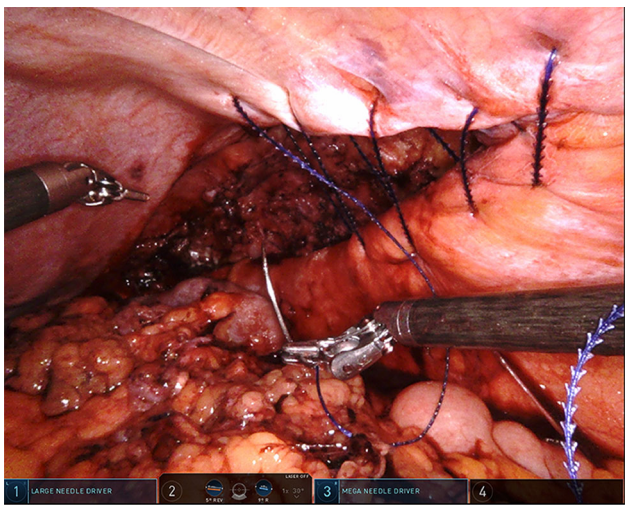
In the acute setting, she underwent extremity fracture repair and was discharged home with physical therapy as well as hernia precautions. A month later, she returned for an elective robotic hernia repair. Under general anesthesia, in a right semi-decubitus position, three ports (infraumbilical, RUQ, LLQ) were placed. The splenic flexure of the colon, portions of omentum, and the spleen were incarcerated within the left TAWH which was complex with two components between ribs; inferolateral and superiolateral. Extensive adhesiolysis was required to reduce the contents. The defect was subsequently closed with a locking PDS suture in a running fashion followed by deployment of a low profile bioresorbable coated permanent mesh which was sutured in place circumferentially and at the midpoint. The patient was discharged the following day and was seen two weeks later in the office. She has made an uneventful recovery with no subsequent pain, functional issues, or recurrence.

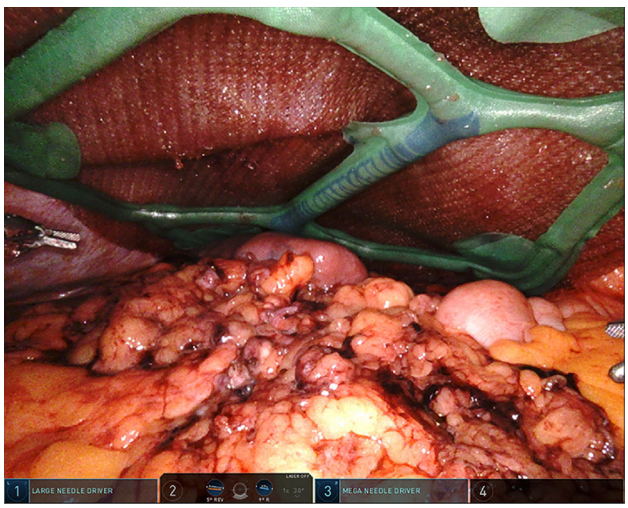
Conclusion: Robotic repair is a viable option for complex TAWH. The seven degrees of freedom in hard-to-reach hernias are an enormous advantage. An open repair in the patient would not only have been technically difficult given the location, but would have significantly increased her pain, infection risk, and overall morbidity given her obesity. Given the location of the hernia between the ribs, the standard laparoscopic approach would not have allowed the angles necessary to secure the mesh with a tacker. Our case demonstrates the advantages of robotic repair of TAWH.











P371

Developing a Robotic Surgery Curriculum: Construct Validity Analysis of a Novel Virtual Reality Training Platform

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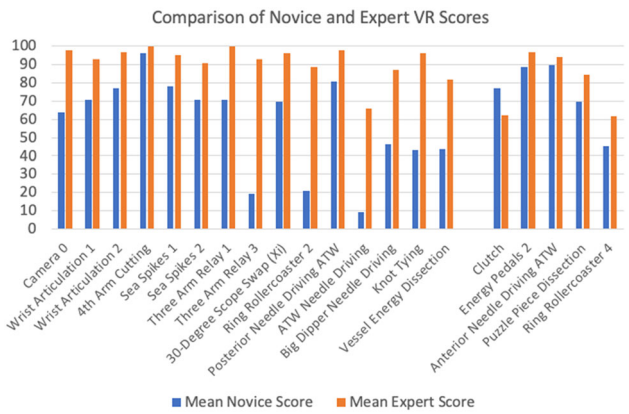
Fig. 1 Comparison of the mean novice and expert score for the 20 VR tasks. Significant differences ($p < 0.05$) were observed for all tasks except for the last 5 on the right



Background: Despite the importance of simulation training for developing foundational robotic skills, there is no consensus on a validated training curriculum. Our institution recently implemented a Virtual Reality (VR) skills curriculum for General Surgery residents using the da Vinci SimNow platform and found it to be feasible, effective, and transferable to the robotic inanimate environment. A subsequent content validity analysis reduced the number of VR tasks from 33 to 20 and identified 3 inanimate tasks on the da Vinci Xi robot to fill content gaps in the VR curriculum and serve as a bridge to more complex simulation exercises. This study aimed to identify proficiency thresholds for each task through a construct validity analysis.

Methods: Two expert robotic surgeons performed 5 repetitions of each VR and inanimate task. VR task performance was assessed by SimNow's automated scoring formula and inanimate task performance was assessed via a previously validated scoring system utilizing time and errors. The lowest scoring attempt was eliminated, and outlier attempts were excluded. The mean score of the remaining repetitions became the proficiency threshold for each task. Mann Whitney-U test was used to compare the first attempt scores from residents (n = 41, PGY2-4) in the first iteration

of the curriculum to the expert scores to determine if the proficiency score effectively differentiated novices from experts.

Results: Proficiency thresholds were identified for the 20 VR tasks and the 3 inanimate tasks. Comparison of expert performance with historical trainee performance demonstrated that 5 VR tasks did not differentiate experts from novices ($p > 0.05$). Four of these tasks were deemed desirable as introductory exercises and retained in the curriculum as non-proficiency-based tasks (3 repetitions required); one was excluded. For the inanimate robotic tasks, two standard deviations were subtracted from the mean expert score to determine a proficiency score deemed attainable by trainees. Figure 1 illustrates the mean novice and expert performance on the 20 VR tasks.

Conclusion: This construct validity analysis identified 15 VR tasks that differentiated novices from experts and allowed selection of unique proficiency scores for these VR tasks and 3 inanimate robotic tasks. These data provide further validity evidence to support our introductory robotic skills curriculum for surgery residents.

P373

Conversion of Robotic Pancreaticoduodenectomy to Open Resection

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Background: Robotic approach for resection of pancreatic head mass has increased since 2010. However, much research has been limited to Academic Comprehensive Cancer Programs. Within this setting, adequate tumor and lymph node resection, safety, and feasibility of robotic pancreaticoduodenectomy (PD) for pancreatic head tumors has been demonstrated. Little data exists focusing on patient selection for robotic approach and intra-operative conversion from robotic to open. This study focuses on a series of PDs booked as robotic at an Integrated Network Cancer Program (INCP) and subsequent completion as robotic versus conversion to open.

Methods: All PDs booked robotically (performed by two primary attending surgeons with assistance of residents and one additional attending) were examined since the institution of the robotic hepatopancreatobiliary program (2014–2020) at an INCP not associated with an academic center. Variables collected include age, weight, BMI, American Society of Anesthesiologists (ASA) Classification, indication for pancreatic resection, pre-operative chemotherapy, PD completion (robotic or open), and conversion to open. Completed cases requiring conversion to open were compared to those remaining robotic using Student's t-test, Mann–Whitney U-test, Fisher's Exact Test, and Pearson's Chi-Square.

Results: Of 118 cases examined, 108 (91.5%) were completed. Robotic PD was indicated for pancreatic head adenocarcinoma (N = 50, 46%), duodenal/ampullary tumor (N = 25, 23%), intraductal papillary mucinous neoplasm (N = 19, 18%) and a minority of pancreatic neuroendocrine tumor, cholangiocarcinoma, or other. Thirty-three (31%) patients received pre-operative chemotherapy. Fifteen percent of completed cases were converted to open for vascular injury, tumor burden near vascular structures, and peripancreatic inflammation. There was no difference in age, BMI, gender, ASA classification, chemotherapy status, or indication between cases which required conversion to open and those completed robotically or between the two surgeons. There were no significant differences in conversion to open or completion rates over time when analyzed in aggregate. There did exist a significant difference in conversion rate between the two surgeons ($p = 0.015$), one of whom was trained by the other.

Conclusion: This study demonstrates patient comorbidities and pre-operative chemotherapy may not play a role in conversion to open from robotic PD. Instead, robotic PD should be considered on an individual basis accounting for patient and tumor anatomy. Further investigation into improved selection of patients to undergo robotic PD could decrease cost associated with starting a case robotically and converting to open or aborting all together. Further investigation into the conversion rate associated with individual learning curve is indicated.

P374

Early Experience with Robotic Surgery During Covid-19 Pandemia. Still a Long Way to go!

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Robotic surgery has been approved in USA and performed for more than 20 years. In many countries as ours, there have been many difficulties including high cost, training and credentials for surgeons and nurses. We inform our early experience as well as all the drawbacks during this 2020 – 2021 period.

Material & Methods: We started our training for the daVinci surgical system in simulators at the end of 2020. There were included 4 general surgeons, 1 oncology surgeon, 3 urological surgeons, 4 gynecologist surgeons. All of them practiced for a minimum of 2–3 months in order to obtain the online assessment of da Vinci/Intiuitive and the off-site training program for Console Surgeon in USA. After successfully completed the training all of them started with surgical practice in the Hospital under "proctor supervision" who has more than 50 cases/year of experience. All were consecutive cases approved by our hospital-robotic committee.

Results: From January to September 2021, we included 50 cases: 15 in general surgery, 6 in oncology surgery, 12 in urological surgeries and 17 in gynecologic surgery. Mortality 0%, Morbility 8%, Operation time: 2–5 h, hospital stay: 2 ± 1 days, overall cost: > 30%. Convertion to open surgery: 6%.

Conclusions: This early experience has demonstrated that robotic surgery can be performed safely in our hospital. Our group is very enthusiastic with the surgical system, and this new technology has permitted us to work as a multispecialty group. This early results are encouraging, but we have noticed the increases in overall cost, longer surgical time and not a real difference with the laparoscopic surgery performed for more than 3 decades in our practice. We are also aware of skepticism in the medical community, insurance carriers and patients. Our challenge will be in the future to demonstrate that robotic surgery is not only feasible and secure, but with experience is better than standard minimal access surgery for complex cases. Our goal will be a RCT in all surgical specialties involved to really prove the benefits for the patients.

P375

Laparoscopic Converted to Open Cholecystectomy Compared to Robotic Cholecystectomy, Reduced Cost of Care With Increased Postoperative Morbidity and Mortality: A Population Based Study

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Introduction: Laparoscopic cholecystectomy (L-CCY) is the gold standard for elective and emergency cholecystectomy. There are 5% to 30% conversion rates to open cholecystectomy, with increased perioperative morbidity and mortality. Recently, robotic assistance for cholecystectomy (R-CCY) in acute cholecystitis patients is preferred, due to perceived decrease in conversion rates. The current study aims to compare the outcomes of R-CCY to those that require conversion to open cholecystectomy (O-CCY) during L-CCY.

Methods: National Inpatient Database (NIS 2009–2014) was used to identify adults who had undergone laparoscopic converted to open cholecystectomy (ICD-9 V64.41), as well as robotic cholecystectomy (ICD-9 51.23, 51.24 and 17.42). Demographic and clinical variables and cost of hospitalization were compared between the groups. Standard statistical analysis was performed.

Results: 18,163 total patients were identified of which 17,538 (96.57%) received L-CCY to O-CCY and 622 (3.42%) received R-CCY. Average age was 58.4 ± 17.4 with 59.6% of the population being of caucasian race. R-CCY patients had lower Charlson's score ($p < 0.01$), higher discharge to home (92% vs. 79.6%; $p < 0.01$) and suffered lower mortality (0% vs 0.5%; $p < 0.01$). L-CCY to O-CCY patients suffered significantly higher incidence of respiratory (2.8% vs. 1.0%), cardiac (1.3% vs 0%), gastrointestinal (5.3% vs. < 0.5%) complications, postoperative infection (1.1% vs. < 0.5%) and hemorrhage (2.7% vs. < 0.5%). No difference was seen in terms of postoperative sepsis (1.3% vs < 0.5%; $p = 0.13$). Lower length of stay (3.4 days vs. 6.4 days; $p < 0.01$) and higher cost of hospitalization (56,375.22 ± 36,657.80 vs. 19,034.28 ± 40,831.86; $p < 0.01$) was noted in R-CCY patients.

Conclusion: The current study highlights the advantages of R-CCY in acute cholecystitis patients. R-CCY patients had a decreased incidence of postoperative cardiopulmonary and wound complications; yet tend to be healthier overall. While overall cost of robotic cholecystectomy is higher, decreased length of stay and greater likelihood of being discharged to home likely results in decreased healthcare spending overall. Further studies are needed to see the effect of robotic cholecystectomy on the overall cost of healthcare in patients with acute cholecystitis.

Table 1. Comparison of Demographic and Clinical Characteristics of Patients Receiving Cholecystectomy for Acute Cholecystitis, Separated According to Type of Surgical Intervention

Variables	Total	Laparoscopic converted to open Cholecystectomy	Robotic assisted Cholecystectomy	P value
Age , Mean±SD	58.44± 17.39	58.73± 17.31	50.43± 17.62	<0.01
Race, N (%)				
Caucasian	10,810 (59.5%)	10,456 (59.6%)	354 (56.9%)	<0.01
African American	1,765 (9.7%)	1,686 (9.6%)	79 (12.7%)	<0.01
Hispanic	2,896 (15.9%)	2,756 (15.7%)	140 (22.5%)	<0.01
Asian Pacific Islanders	429 (2.4%)	428 (2.4%)	0 (0%)	<0.01
Others	2,263 (12.5%)	2,215 (12.6%)	48 (7.7%)	<0.01
Charlson's Score, (%)				
Score 0	2,611 (14.4%)	2,433 (13.9%)	168 (27.0%)	<0.01
Score 1-3	7,879 (43.4%)	7,582 (43.2%)	297 (47.7%)	<0.01
Score 4-5	5,787 (31.9%)	5,671 (32.3%)	116 (18.6%)	<0.01
Score >6	1,883 (10.4%)	1,842 (10.5%)	41 (6.6%)	<0.01
Outcomes (N, %)				
Home	14,530 (80%)	13,958 (79.6%)	572 (92%)	<0.01
Transfer to other facility	1,740 (9.6%)	1,722 (9.8%)	18 (2.9%)	<0.01
Home with Home health	1,769 (9.7%)	1,738 (9.9%)	31 (5.0%)	<0.01
Died during current hospitalization	83 (0.5%)	83 (0.5%)	0 (0%)	<0.01
Complications (N,%)				
Respiratory complications	2.7%	2.8%	1.0%	<0.01
Cardiac	1.2%	1.3%	0%	<0.01
Urinary	0.9%	1.0%	<0.5%*	0.155
Sepsis	1.3%	1.3%	<0.5%*	0.13
GI	5.1%	5.3%	<0.5%*	<0.01
Hemorrhage	2.6%	2.7%	<0.5%*	<0.01
Pos-op Infection	1.1%	1.1%	<0.5%*	<0.01
Total Cost, Mean±SD	49285.5± 404715.2	19034.3± 40831.9	56375.2± 36657.8	<0.01
Total LOS, Mean±SD	6.3± 3.9	6.4± 3.9	3.4± 2.8	<0.01

*Exact data not reported due to small numbers, to reduce risk of re-identification. HCUP data user agreement

P376

Establishing the Learning Curve for Single-Port Robotic Transanal Minimally Invasive Surgery

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Introduction: A novel single port robotic device offers solutions to challenges of transanal surgery by TEM/TAMIS. Criticism of robotic procedures have centered around increased complexity as a barrier to adoption. The objective of this study was to determine the number of SP rTAMIS procedures required to reach the learning curve using the SP robot.

Methods: This analysis of a prospective database of 40 consecutive patients who underwent SP rTAMIS included 19 men/ 20 women, average age of 59.9 years(44–83 years). Learning curves by pathology and lesion size were calculated using cumulative sum analysis. Phase 1 represents initial learning phase, Phase 2 competency phase, and Phase 3 mastery phase. Paired t-test was applied to calculate statistical significance.

Results: Average docking time for SP rTAMIS was 4.9 min(1–13 min) and the learning curve was reached at the 20th case. In the initial learning phase, the average time was 6.1 min, and decreased to 2.2 min at mastery.

Average operative time (minutes) for each phase of the learning curve

Average Time(min)	Benign (n = 18)	Malignant (n = 21)	0–3 cm (n = 14)	> 3–4 cm (n = 13)	> 4 cm (n = 12)
Overall	178.2	215.6	152.7	189.8	224.2
Phase-I	210.3	231.5	161.3	203.5	234.8
Phase-II	195	206.8	153.8	216.5	246
Phase-III	136	166	144.8	126.7	177.3
Learning Curve	9thcase	16thcase	7thcase	8thcase	7thcase

Average operation time was not statistically different comparing benign versus malignant lesions($p = 0.07$). The learning curve was reached at 9th case versus 16th case. There was a significant difference between the average operation times for lesions 0-3 cm versus > 4 cm($p = 0.03$), but the learning curve was reached at the 7th or 8th case for all sizes.

Conclusion: The learning curve for SP rTAMIS is relatively short. Learning curve for SP rTAMIS was 7–8 cases regardless of size. Operative time was longer for malignant than benign disease but did not reach statistical significance. Docking times were short in all phases of the learning curve within 4 min between the initial to mastery phase. This study supports our initial impression that SP rTAMIS will be easily and quickly adopted however more experience and multi-institutional studies will be needed.

P455

Integrated Fecal Microbiome and Serum Metabolomic Analysis Reveals Key Metabolic Pathways After Roux-en-Y Gastric Bypass and Sleeve Gastrectomy: A Three-Arm Prospective Clinical Trials

Jerry T Dang, MD, PhD[1]; Valentin Mocanu, MD, PhD[1]; Heekuk Park, PhD[2]; Michael Laffin, MD, PhD[1]; Naomi Hotte, MSc[1]; Shahzeer Karmali, MD, MPH[1]; Karen Madsen, PhD[1]; Daniel W Birch, MD, MSc[1]; [1]University of Alberta; [2]Columbia University

Introduction: The aim of this study was to investigate the microbial, metabolomic, and inflammatory changes that occur with Roux-en-y gastric bypass (RYGB) and sleeve gastrectomy (SG) and compare them with patients who underwent dietary and behavioral interventions (CTRL).

Bariatric surgery is the most effective modality for the treatment of severe obesity and metabolic syndrome. However, the underlying mechanisms for weight loss following RYGB and SG are not completely understood, and multiple mechanisms are thought to play a role. Evidence is emerging that the intestinal microbiome plays an important role in the development of obesity and contribute to the effects of bariatric surgery. We hypothesize that altered intestinal physiology following RYGB and SG leads to specific changes microbial populations that contribute to metabolomic and inflammatory pathways that subsequently result in weight loss, reduced inflammation, and improved glucose tolerance.

Methods and Procedures: This study was a three-arm parallel prospective interventional clinical trial with participants in RYGB, SG, CTRL cohorts. Clinical parameters, blood samples and fecal samples were collected pre-intervention and at 3 and 9 months. A multi-omics approach was used to perform integrated microbial-metabolomic analysis to identify functional pathways in which weight loss and metabolic changes occur after bariatric surgery.

Results: Eighty patients were recruited (CTRL 28, SG 23, RYGB 28). RYGB demonstrated the most significant microbial changes with decreased alpha-diversity and significant beta-diversity between timepoints. Integrated microbial-metabolomic analysis revealed a unique pathway in which RYGB was associated with decreases in the abundance of Romboutsia which correlated to decreases in glycerophospholipids as well as lower weight and insulin resistance.

SG demonstrated a unique pathway linked to the decreased abundance of a cluster of three Firmicutes bacteria. This Firmicutes shift was correlated with an increase in five amino acids which consequently enriched the aminoacyl-tRNA pathway. The loss of this cluster also correlated with lower weight, decreased insulin resistance, and decreased systemic inflammation.

When performing between group comparisons, SG demonstrated an enriched pathway at 9 months compared to RYGB. This was the sphingolipid metabolism pathway which was enriched due to the loss of a cluster of five Firmicutes bacteria which correlated to increases in sphingomyelins and hydroxysphingomyelins. This Firmicutes shift was also linked to improved glucose tolerance.

Conclusions: This prospective clinical trial provides a comprehensive analysis of the complex microbial-metabolomic relationships in bariatric surgery and identified pathways that may be the future target of therapeutic strategies for the treatment of obesity and metabolic disease.

P456

New Persistent Opioid use After Bariatric Surgery: A Systematic Review

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Introduction: Increasing evidence suggests surgical patients are at risk for developing a new, persistent opioid use (NPOU) following surgery. This risk may be heightened for patients undergoing bariatric surgery. Few studies have evaluated this important long term outcome and little is known about the rate of NPOU or risk factors in a bariatric surgery patient population.

Methods and Procedure: We conducted a systematic review of MEDLINE, Embase, Scopus, Web of Science and Cochrane databases in August 2021. Studies were reviewed and data extracted independently by two reviewers following MOOSE guidelines. Studies evaluating bariatric surgery patients reporting NPOU, defined as new opioid use > 90 days after surgery, were included. Abstracts, non-English, animal, $n < 5$, and pediatric studies were excluded. Primary outcome was NPOU prevalence, secondary outcomes were demographic and surgical risk factors for NPOU. Risk factors are reported from findings of individual studies; meta-analysis could be completed due to heterogeneity of reporting.

Results: We retrieved a total of 2113 studies with 8 meeting full inclusion criteria. In studies reporting NPOU rates ($n = 5$ studies), pooled prevalence was 5% (95% CI 3%-8%). Patient characteristics reported by studies to increase risk of NPOU included prior substance use (tobacco, alcohol, other prescription analgesics), preoperative mental health disorder (anxiety, mood disorders, eating disorders), and public health insurance. Surgical risk factors for NPOU included severe post-operative complications and in-hospital opioid use (peri or post operatively). No difference was consistently reported for type of surgery (Roux-en-Y gastric bypass or sleeve gastrectomy).

Conclusions: NPOU is an uncommon but important complication following bariatric surgery, with patient factors including prior substance abuse, mental health disorders, and use of public health insurance placing patients at increased risk. Studies evaluating techniques to reduce NPOU in these high-risk populations are needed.

P457

Efficacy of Preoperative High-Dose Liraglutide in Patients with Super Obesity

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Introduction: Preoperative weight loss prior to bariatric surgery is imperative in optimizing patients for surgery. Glucagon-like peptide-1 receptor agonists, such as Liraglutide, have been approved for weight management. We aimed to study the efficacy of Liraglutide as a preoperative adjunct in patients with super obesity.

Methods and Procedures: A retrospective cohort study enrolled at a single bariatric center of excellence between July 1, 2014 and June 30, 2017 was performed. All adult patients with BMI $\geq$ 50 kg/m2 and no diabetes or previous bariatric surgery were included. Outcomes of interest included rate of successful laparoscopic roux-en-y gastric bypass (LRYGB), amount of preoperative Optifast diet required, amount of preoperative and postoperative weight loss, and postoperative complications.

Results: A total of 2369 charts were reviewed, with 412 patients meeting inclusion criteria. The average age was 41.76 $\pm$ 11.00 and 292 (70.9%) were female. Of the 412 patients, 49(11.9%) had surgery with preoperative Liraglutide, 63(15.5%) had surgery only, 51(12.4%) had Liraglutide only, and 190(46.1%) had neither. The average duration of preoperative Liraglutide treatment was 8.92 $\pm$ 5.69 months. Patients who had preoperative Liraglutide lost an average of 8.49 $\pm$ 5.02 kg/m2 versus 6.34 $\pm$ 4.75 kg/m2 in patients without ($p < 0.05$). Preoperative Optifast was used in 21(42.9%) of patients with preoperative Liraglutide versus 22(34.9%) of patients with surgery only (OR:1.40, 95%CI:0.65–3.04, p = 0.44). The average length of Optifast was 13.24 $\pm$ 10.48 weeks versus 11.77 $\pm$ 9.12 weeks (p = 0.63). LRYGB was the surgery performed in 36(73.5%) of patients with Liraglutide versus 44(69.8%) of patients without Liraglutide. However, 1(2.7%) patient in the Liraglutide group was unable to undergo LRYGB due to technical limitations versus 3(6.4%) in the surgery only group (OR:2.46, 95%CI:0.35–32.66, p = 0.63). Both groups had 4 (8.2% versus 6.3%) patients with complications at 30 days (OR:1.31, 95%CI:0.36–4.69, p = 0.73), but the Liraglutide group only had 1(2.0%) additional complication at 1 year versus 4(6.3%) in the surgery only group (OR:0.31, 95%CI:0.02–1.98), p = 0.38). Of the 112 surgical patients, 21(18.8%) were treated with both preoperative Liraglutide and Optifast and lost an average of 9.58 $\pm$ 6.48 kg/m2, compared to 28(18.8%) with only Liraglutide lost 7.67 $\pm$ 3.20 kg/m2, versus 22(19.6%) with only Optifast lost 9.50 $\pm$ 4.89 kg/m2, and 41(36.6%) without either preoperative treatment lost only 4.68 $\pm$ 3.65 kg/m2.

Conclusion: Patients undergoing bariatric surgery treated with preoperative Liraglutide had more preoperative weight loss, but did not account for increased in technical feasibility of LRYGB, reduction of preoperative Optifast use, or reduction of postoperative complications. Liraglutide may be a useful adjunct for preoperative weight loss in patients with super obesity.